An investigation into the effectiveness of CLIL in improving second-language competency in Mathematics in an intermediate school in Abu Dhabi

التحقق من فاعلية التعلم القائم على دمج اللغة والمحتوى في تحسين كفاءة اللغة الثانية في مادة الرياضيات لمدرسة في المرحلة المتوسطة في أبوظبي

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Dissertation submitted in partial fulfilment of the requirements for the degree of TESOL

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Acknowledgement

The study undertaken to complete was carried out under the guidance of my supervisors at the British University of Dubai, to whom I am very grateful for their support and guidance. I would also like to thank Sarah Hrynczak for supporting me through the work and allowing me the time to spend with her in order to obtain information.

Finally I would like to thank my parents, friends & family who have given me the support, understanding and help during the entire project.

Abstract

Content and Language Integrated Learning (CLIL) is increasingly being introduced across the global mainstream education sector. The idea that the English language can not only be used to teach subject content, but actually enhance its delivery, is a controversial but widely recognised claim being put to the test by modern researchers.

This study investigates the use of CLIL for the teaching of mathematics in a secondary government school in Abu Dhabi, UAE. It tests hypotheses based on two research questions, *(1) How does the implementation of CLIL activities affect students' achievement in Mathematics and English? (2) Is students' motivation increased through the use of CLIL in the Mathematics classroom?*

The findings suggested that the use of CLIL had a positive impact on student achievement when compared with the control group. According to results from student, teacher and parent questionnaires and semi-structured interviews, motivation was also positively affected in the CLIL classes. A key finding that emerged was the presence of Gifted and Talentedness amongst the learners and how this impacted upon the assessment results. Given the limited availability of up-to-date CLIL research, especially in the Middle East, all of the areas addressed warrant further research.

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CHAPTER 1 **INTRODUCTION**

In this study an investigation will be discussed on the effectiveness of CLIL in improving second-language competency in an intermediate main stream Abu Dhabi Educational Council school. In 2005, The Al-Ittihad newspaper identified 11 major issues in the education system of the UAE (Al-Ittihad, 2005:8-9). Over the next 10 years, 46 billion dirhams would be invested in the educational infrastructure of the UAE. However this was still 60% less than the current international standards. Recently, Abu Dhabi Educational Council (ADEC) has implemented a new Maths, Science and English curriculum with the focus on the use of English medium. The purpose was to enhance English language competency so that students may pursue further undergraduate studies without the need of additional English language support.

Content and Language Integrated Learning (*henceforth* CLIL), is mostly implemented in English and is regarded, despite some reservations, as an innovative or alternative approach to Communicative Language Teaching (CLT)(Dalton-Puffer, 2011; Bruton, 2011). Stakeholders, researchers and other affiliates involved in teaching foreign languages embrace CLIL in the hope that deficiencies in foreign language learning can be overcome so as to meet new socioeconomic needs (Coyle, Hood, and Marsh, 2010; Lasagabaster and Sierra, 2010).

However, CLIL is not only about its advantages.There are many obstacles to overcome when asking a teacher to teach in L2 to L2 students, particularly when asking them to use communicative activities and expecting them to use English naturally and spontaneously in the classroom. Cullen (1194) noted the additional pressures on non-native teachers using English to be at a high level in L2, and the extent of the language demands which the communicative approach makes on teachers. However, Medgyes (1992) contended that teachers with a deficient command of English may actually have advantages, since they are learners of English themselves and can empathise with students, perhaps understanding their needs in ways which a native speaker cannot.

Still, as the researcher attempted to do with this study, there are ways, even for teachers at lower levels of English, that professional development can be tailored in order to support these teachers to meet the demands of the new curriculum. In her paper on the educational reform in Abu Dhabi, Maffini suggests: Teachers need training on how to best extract more language from their students by themselves being models of good language and having the confidence to speak the language in the classroom ... Continuous training of local teachers to improve their English language skills will result in a generation of teachers who can effectively teach the curriculum in both languages in the future (2010: 56).

My interest here stems from the rise of CLIL in international education. This study examines in depth what is considered good practical teaching in second language learning. CLIL offers opportunities to allow youngsters to use another language naturally, in such a way that they soon forget about the language and only focus on the learning topic (Marsh, 2009). There are two main aims: one related to the subject, topic, or theme, and one linked to the language. This is why CLIL is sometimes called *dual-focuseducation*. The main aim of CLIL is to gain knowledge and skills simultaneously, in other words, we learn best by effectively experiencing both learning about the issue or subject, and having practical experience in the use of the topic. Though there are many paradoxes to this research, this is partly due to limitations of the research and the scope. This research is also specific to a particular setting. However it does not deter the fact that the research is valuable in my current setting.

The hypothesis and this research tests claims about the following questions:
- How does the implementation of CLIL activities affect students' achievement in Mathematics and English?
- Is students' motivation increased through the use of CLIL in the Mathematics classroom?

Furthermore, this study examines and analyses the effectiveness of CLIL in mainstream teaching. Planning, interaction and participation are key indicators as well as assessment which is difficult in some ways to establish.

Areas of controversy in the literature will be identified and at the same time questions will be formulated that need further research. The type of literature review being conducted is diverse and also looks at issues of theory, methodology, policy, quantitative and qualitative research. The scope again is utilising various resources which are all relevant to the research. The main discipline is in education. The main hypothesis is the effectiveness of CLIL in improving second Language competency in an ADEC intermediate school in mathematics with the effects of certain variables.

CHAPTER 2 **LITERATURE REVIEW**

2.1 Introduction on CLIL

My research question is to investigative a study on the effectiveness of CLIL in improving second language competency in an intermediate main stream school in Abu Dhabi.

As important as CLIL is, the term was originally coined by David Marsh of the University of Jyväskylä, Finland, and is intended as a way to integrate both content and language needs in subject courses (Marsh, 2002). It can be seen as an umbrella term for various programs and methodologies, such as Content-Based Instruction, English Across the Curriculum, English as an Academic Language, and Bilingual Integration of Languages and Disciplines (Mehisto et al, 2008).

Features of CLIL are more advanced than normal lessons and they remind us of the importance of creating solid instruction and designing lesson plans that foster learning for all students. This takes into account language, content and learning skills as well as relevancy that may promote cooperation andmeaningful communication. We should also take into account authentic learning experiences and students' learning goals and at the same time ensure active, safe environments as well as cultural influences (Mehisto et al, 2008). Multiple reasons are given for the importance of CLIL such as allowing students to cope with language needed for content courses, integration of both content and language, support analysis and improving the cognitive domain, to name a few. This will be discussed further in the research.

There are many variables connected with the effectiveness of CLIL, such as application of motivational theories, the effectiveness of outcome based educational (OBE) concepts and first language competency (FLC). Their effectiveness, efficiency and progression are increased if the right variables are applied. One of the key elements of the use of CLIL is motivation. Here, consideration for both various motivational theories and its effectiveness will be elaborated upon. The issue of motivation, which is a key component in CLIL (Lepper, 2005), will be

discussed in detail in terms of both intrinsic and extrinsic motivation. Intrinsic motivation can be defined as engagement in an activity with no reason other than the enjoyment and satisfaction of engagement itself (Maslow, 1954), whereas extrinsic motivation refers to engagement that provides means to ends that go beyond the engagement itself (Nissan, 1992). It has to be taken into consideration that CLIL is not a new phenomenon. It has been used for centuries to provide linguistically-enhanced education in which students have a *plurilingual*ability to use two or more languages (Marsh, 2009). However, this has been focused on by the elite of our society to multi-communicate. Today, by allowing CLIL into mainstream education it dismantles such legacies of the past. Societies are also evolving rapidly, especially with the use of the internet. The use of multi-languages is increasingly becoming more beneficial and it is this understanding which has given rapid rise to CLIL. There are also social, economic, cultural and ecological advantages to be gained through promoting plurilingualism through language learning right across our societies. CLIL allows more advantages for our students in their everyday lives.

The need for exemplary practices in CLIL is also a partial focus in this research and, as such,as well as the four key principles of content, communication, cognition and culture, sub-entities such as delivery, planning, explicit language teachingand links with target language countries will also be addressed (www.cilt.org.uk, accessed 03-01-13).

As aforementioned, CLIL is not a new concept. However, strategies have varied based on environments, cultures and socio-economic needs. Key topics will be discussed in this research such as the following:
- Motivational theories and ideas.
- Outcome based education (OBE) and its effect on CLIL.
- Effects of the variables and its impact based on the level of increment.

2.2 CLIL: Descriptions and Definitions

CLIL has been bold enough to encapsulate itself within an acronym; implying that it is an approach and a philosophy - an educational paradigm with frontiers that can be defined (Ball, 2012). It has been practiced since the Babylonian era and introduced in many schools in the early sixties around the world. It was largely invented in the mid-1990s and is growing in its popularity. CLIL has been in use indirectly in many schools which have utilised CLIL in different ways. However CLIL refers to situations where subjects are taught through a foreign language with dual-focused aims, hence it can be considered as the learning of content and the simultaneous learning of a foreign language(Marsh, 1994).If one teaches EMI (English as a Medium of Instruction), LAC (Language Across the Curriculum), CBI (Content-based Instruction) or CBLT (Content-based Language Teaching; if one works in Bilingual Education or is a subject teacher working through the medium of a foreign language, they work within the area of CLIL (Ball, 2012).

CLIL has a twin set of objectives: those that are educational (to learn subject content and a foreign language) and those that are administrative. The European Commission resolution from 1995 also clearly indicates that by the time European Union citizens leave school they should be able to speak two languages other than the mother tongue. Curricula have attempted to achieve this by finding timetable space and it is believedby many that CLIL is the answer. Other countries outside of the European Union have also followed suit, such as the UAE, which has recently implemented an extensive educational reform project, with CLIL defined as one of its key goals.

CLIL is different from simple English medium education and English proficiency is not a requirement before studying the subject (Graddol, 2006). However, this is not as straightforward as it may seem - there are many criticisms to this approach. Reasons given for such criticismsincludetime-consuming adjustments to teachers' methodology, the need for evaluation of skills-based focus, the need for reflection on current and new materials(Marsh,

Marsland and Stenberg, 2001).Finally, CLIL is about using languages to learn. It allows us to think how we communicate, even in L1.

With its *'dual-focused'* aims, CLIL encompasses perfectly this post-modern, utilitarian view of the English language, though liberal educationalists may not agree with it. CLIL also seems to largely focus on '*motivation*', which many educators as well as many scholastic textbooks have identified. Nonetheless, we still search for the *'hunger to learn'* stance as Marsh *et al* claim. We need to know the reasons: that is, is this claim true (Ball, 2012)?

One of the pioneers or developers of CLIL is David Marsh. He created and coined the acronym similar to, but distinct from, language immersion and content-based instruction.The idea of its proponents was to create an *'umbrella term'* which covers different forms of using language as medium of instruction. According to Marsh, it is based on methodological principles established by research on *'language immersion'*. This has been crucial to the European Commission as they have promoted teacher training *"...enhancing the language competences in general, in order to promote the teaching of non-linguistic subjects in foreign languages"* (Council Resolution of 21 November 2008 on a European strategy for multilingualism).

2.3 Common principles behind CLIL and the four Cs

It is incumbent upon teachers and implementers of CLIL to understand the common principles behind CLIL which are varied and many. In CLIL, attention is given to the topic as well as the language - English is simply the medium used. The importance is given to the topic and the language gives a more integrated methodology of learning and teaching, focusing on the educational process as a whole in comparison to how languages are taught. The student is also an active participant in the language; they are involved in it, influenced by it and engulfed in it. They are using the language, but the context, theme and task are the main focus here. It is clear that once the students are interactive and have a keen interest in the subject they automatically become motivated to learn the subject and hence then learn the language needed to communicate more effectively (www.developingteachers.com: 2002-2012).CLIL has

also been called *'education through construction, rather than instruction'* which again puts the focus on the students, who actively learn and build their language skills because they have to, not because they are being taught to. CLIL is based on language acquisition rather than enforced learning. Hence the author believes that all subjects should have some form of acquisition learning, in other words, practical as well as theoretical.

In L2 language fluency is more important than accuracy. The nature of CLIL lessons means that the students will produce (and be exposed to) a vast array of language, the focus is firmly on communication and accuracy comes with time. Mistakes are frequent; however the focus again here is not accuracy but communicative competency. CLIL promotes critical thinking and collaboration skills as well as language proficiency. It produces global citizens with enhanced motivation and self-confidence.

In order to understand the crux of CLIL, we need to discuss what a successful CLIL lesson should combine. According to Marsh (2002), it has four principles, as shown in figure 2.1.

– Content - progression in knowledge, skills and understanding related to specific elements of a defined curriculum
– Communication - using language to learn - whilst learning to use language. The key is interaction, NOT reaction.
– Cognition - developing thinking skills which link concept formation (abstract and concrete), understanding and language.
– Culture - exposure to alternative perspectives and shared understandings, which deepen awareness of otherness and self.
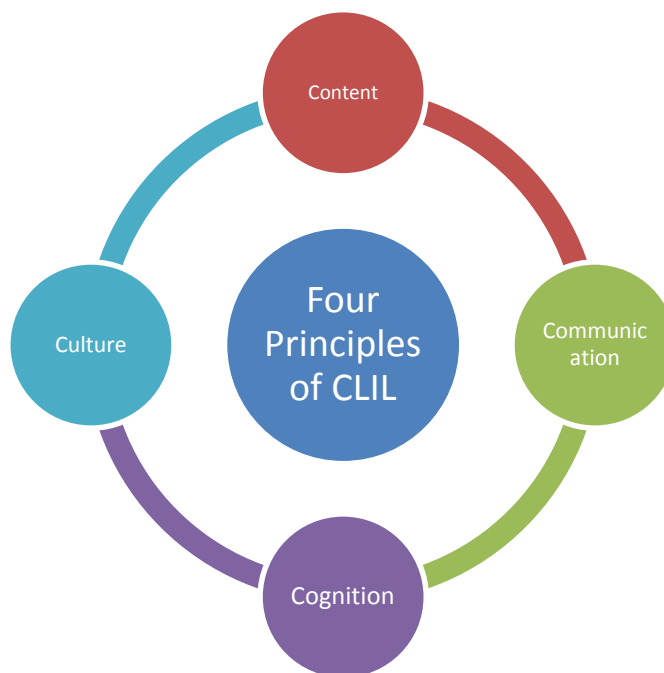
Figure 2.1. CLIL lesson principles (Marsh, 2002).

2.4 Role of Mathematics

Part of the scope of this study is to determine the role of Mathematics in using CLIL. Case studies so far indicate that there has been much dissent due to the fact that some have worried that the policy will not only hinder the progress of the first language in mathematical realms, but also jeopardise the status of first language as the National and official language. For example, the Chinese educationists insisted that their mother tongue is used in the teaching of Mathematics at the National-Type Chinese Primary Schools, believing that it is the most effective language to facilitate learning at the primary level (ICRJ, 2010). In Malaysia they reverted back to the Malay language after 6 years of consultation. One of the main reasons was Malaysian CLIL teachers found it difficult to teach Mathematics in English. It was also due to the lack of interest by Malaysian students. CLIL, which emphasizes the four research-based frameworks or principles were developed on issues related to content, communication, cognition and community (Mehistoet al: 2008) and this does not seem to be benefitting the students based on research carried out. In this research paper and the relevant new concept

of the UAE version of CLIL, the cognition processes are given emphasis because research of this nature is still at the embryonic stage as opposed to the preponderance of research which delves into communication, content and culture (seeAirey, 2009; Coonan, 2007; Dalton-Puffer, 2006, Dirba&Mencis, 2009; Järvinen, 2006, Seikkula-Leino, 2007).

According to Maria Badinska, PhD, and Dagmar Kokavcova, PhD, CLIL is a way towards autonomy in education. They state that CLIL provides a better preparation for professional life than teaching English as a subject empty of content. It motivates, makes lessons active and interesting. CLIL programmes are thus learning basic language skills, academic skills and new subject concepts at the same time. CLIL focuses on the subject content; it gives students a feeling of real achievement that is closely connected with their career development (Badinska&Kokavcova: 2010), since in the future they will be expected to show "*competences*" and autonomy and an approach prioritising highly developed thinking skills and communication.

2.5 Current World Usage

In the current climate, the European Commission has stressed the importance of speaking in two languages. Various models of bilingual teaching have developed in Europe, which are worth comparing because there are strengths and weaknesses of each. Information on the current status of CLIL teaching in Europe is now very comprehensive. There are four main works that, when read together, provide a good overview of CLIL: the two publications by Marsh (*Profiling European CLIL Classrooms*, 2001; *CLIL/EMILE: The European Dimension*, 2001), which were works written to order for the European Commission, the European Commission Eurydice Report from 2006, and the recently-published Council of Europe Country Report (Maljers*et al*, 2007; Wolff, 2007). The Eurydice Report 2007 provides a detailed overview of the languages that are used as CLIL languages in teaching, and from this report we can see that CLIL is implemented in many forms across Europe. Luxemburg and Malta are the only countries in which all students are taught in at least two languages(Wolff: 2007). It has to be noted that learning a second language in English is not the mainstream; however, it is at the forefront

followed by French and German. It is commonly promoted at primary and secondary level, especially in our case study of the UAE.Whilst the possible duration of CLIL tuition commonly extends until the end of compulsory schooling and could therefore theoretically last for up to ten years, in reality it is highly variable and in many countries goes on until completion of sixth form education.

One critique would be the organisational structure of CLIL in the European context. It has not been introduced across the board anywhere. It is selective for those who wish to learn though the CLIL approach. For instance, learners in the Czech Republic, Slovakia and Bulgaria need to pass entrance examinations if they want to receive CLIL tuition, in which their general knowledge, mathematical and native-language skills are tested. In France and Romania on the other hand, knowledge and ability in the target language is tested before access to CLIL lessons is granted. In the majority of European countries there hasnot, as yet, been any access criteria for receiving CLIL tuition. It is clear from many surveys that there are no stipulations as to which subject groups can be used. A distinction is commonly made between three subject groups, humanities and social science subjects (History, Geography, Social Studies), natural science subjects (Mathematics, Physics, Biology) and creative subjects (Art, Sports, Music). In the majority of countries, natural science subjects are commonly proposed for CLIL-based instruction. It also has to be noted that there are no definitive hours that CLIL is taught. Some schools use 50% or two-thirds of all hours but these are in remote regions of Europe.

CLIL has many critiques as other models have been given greater focus. According to Thomas & Collier (1997), other programme models such as Transitional Bilingual Education, Dual language Immersion, Dual Language programmes and Late-Exit or Developmental Bilingual Education have been extensively established. These programmes have had huge success, especially in terms of linguistic and socio-cultural advantages (Christian: 1996b). As of May 2005, there were 317 dual immersion programs operating in elementary schools in the United States in 10 different languages (Centre for Applied Linguistics, 2005).

Internationally, not all countries use CLIL and primarily focus on the English medium. In Australia, for example, there has been an up-down focus to aboriginal and English, though this is still much debated. In Canada there has been a French immersion programme, however, current education is generally monolingual in either English or French.Nonetheless, English-Immersion Programmes also exist for Francophone children. In the Autonomous regions of China many children of the country's major ethnic minorities attend public schools where the medium of instructions is the local language, such as Uyghur or Tibetan. Classes of Mandarin as a second language are also offered in these minority schools. In Hong Kong, where both English and Cantonese are official, both languages are taught in school and are mandatory subjects; however, studies show that those who studied in their native tongue attained better academic results than those who studied through the English medium.

Some schools in the Middle East follow dual or triple language programmes. History, Grammar, Literature and the Arabic language are taught in the native language (Arabic), whereas Mathematics and Sciences are generally taught in English and/or French. In most Gulf countries and especially in the UAE (Abu Dhabi), which is the focus here, there is a dual-language focus mainly in core subjects such as English, Maths and Science.

2.6 Social Setting of CLIL

Turning now to more social aspects, one of the reasons for the rise of CLIL is because of socio-cultural perspectives. These have been adopted for two reasons: first, the emphasis placed on language as the primary tool mediating the construction of knowledge and understanding, and secondly the recognition of the fundamentally social nature of learning (Moate, 2010). Rapid changes in societies, business and globalisation have pushed for parallel growth in education and multilingualism (Badisca*et al*, 2010).From a socio-cultural perspective, knowledge is understood as a historically constructed, culturally and socially contextualised entity instantiated in language. In this case the knowledge of CLIL is as important as ever due to the expansion of second language English especially in the UAE. The social nature of learning is reflected in Mercer and Littleton's explanation that "learning and development are seen as

both interpersonal and intrapersonal mediated by cultural tools: mind emerges in the course of joint activity" (2007:14). In line with Vygotskian thinking, language enables a reciprocal relationship between knowledge on the social (intermental) plane, before appropriation of understanding on the psychological (intramental) plane. If we are to introduce CLIL into mainstream education then both the intermental and intramentalplanes have to be addressed. (Moate, 2010).

Figure 2.2 shows the subject learning from a socio-cultural perspective can be defined as a dynamic, interactive process under the expert guidance of the teacher, in which learners are apprenticed into the ways of thinking, practices and discourses of a specific subject community. Pupils come to school with an everyday understanding of the world which needs to be transformed into the systematic knowledge of a subject community. This demanding process cannot be achieved through the transmission, rather the transaction of subject knowledge mediated by language (Moate, 2010). Thus, the link between subject-content and language becomes apparent.

Exploratory Talk

Expert Talk

Critical Talk
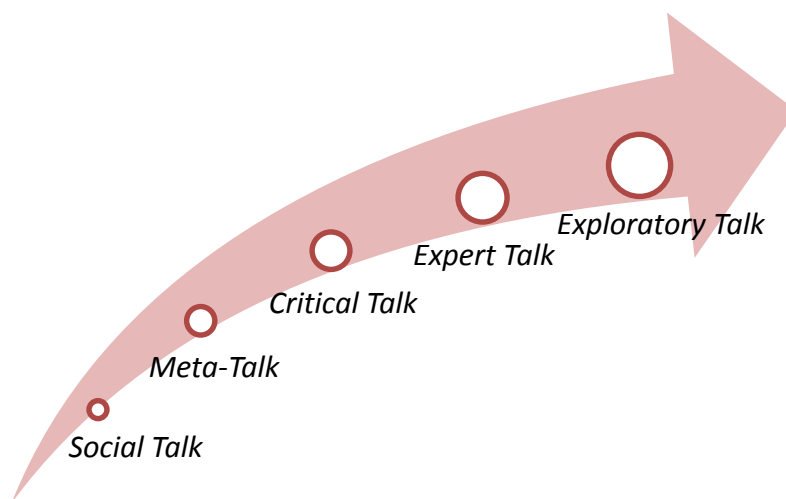
Meta-Talk

Social Talk

Figure 2.2. Socio-cultural process.

It is worthy to note that various socio-lingual activities are now rapidly taking place. *social talk* is the first step in "*community building*" that is to communicate with other students (Pierce and Gilles, 2008: 40). A second talk-type is *meta-talk* which is how language tools, generic or genre-based,are used. The third talk-type of *critical talk* aims to consider and inspire change - this is done by building frameworks in language (Mortimer and Scott, 2003). In contrast, the fourth talk-type *expert talk* is more presentational and demonstrates awareness of community knowledge (Unsworth, 2001). These four talk-types encompass the complex social and cultural setting of the classroom. However,the socio-cultural perspective becomes explicit in the fifth talk-type. In *exploratory talk*, both language and content learning goals come together as learners draw on growing awareness and ability (Moate, 2010).

2.7 Motivation, Theory & CLIL

As defined by Pritchard and Ashwood (2008), motivation is the process used to allocate energy to maximize the satisfaction of needs. It is a psychological feature that compels or reinforces an action toward a desired goal that elicits, controls, and sustains certain goal-directed behaviours. It has been shown to have roots in physiological, behavioural, cognitive, and social areas. Motivation in education can have several effects on how students learn and how they behave towards subject matter.

It is commonly understood that *situated motivation* develops as a result of lack of internal student motivation. This is created by the teacher (environmental conditions). If teachers decided to extrinsically reward productive student behaviours all the time, they may find it difficult to detach themselves from that path. Consequently, student dependency on extrinsic rewards represents one of the greatest detractors from their use in the classroom. Different aspects of motivation were used after the study was concluded to show effects of pre-study and post-study differences, hence, motivational theories were discussed in this study.

One of the key elements of improving and introducing CLIL in classrooms is through motivating students. This is a crucial element to this study, as without motivation CLIL is rather ineffective.

Motivation works in both directions: high motivation is one factor that encourages successful learning; in reverse, successful learning encourages high motivation (Cook,2001). This is so that students have a good command of English. Motivation is a direct determinant of L2 achievement and is in fact one of the individual variables to which more attention has been paid in second language acquisition literature. Currently motivation is analysed with regards to aspects of the language-learning process closely associated with the classroom (Vandergrift, 2005). Despite the perplexity, studies carried out in many different contexts have demonstrated that there is a clear correlation between motivation and language achievement (Masgoret and Gardner,2003). Meta-analysis of studies undertaken by Gardner and associates, in which 75 independent samples and more than 10,000 participants were analysed, concluded that this correlation is largely positive. However, in Canadian schools, results showed that that the correlation between proficiency in L2 listening and intrinsic and extrinsic motivation was not as strong as expected. The motivation achievement relationship is complex and varies as studies show with age. (Dewaele, 2005; Gardner and Tremblay, 1998; Lasagabaster and Huguet, 2007).However, the number of studies in which the temporal dimension of motivation has been examined is limited. Some studies (Chambers, 1999; Williams *et al,* 2002) have demonstrated that motivation wanes in formal school settings over sustained periods. The explanation for this motivational decline could be psychologically based. Here we have used motivational theories to determine when applied the effects on student attainment. These will be discussed further on.

In this section four motivational theories will be discussed, applying these to the CLIL case study to view its effectiveness. Their theories have not been extensively elaborated upon as they can be readily found. They have only been discussed within the context of this study. The researcher has inserted this in the literature review due to its affiliation with motivational theories and brief discussions have been highlighted. They are as follows:

1. **FW Taylor:** After the 1960's his theory did not work as not everyone worked for money. His piece-rate system was not always appropriate, therefore new Japanese models of motivation were introduced.

2. **Elton Mayo's Humans relations theory:** After a 5 year study he realised that workers were motivated by interaction of others. Boredom and repetitiveness of tasks led to reduced motivation. Motivation was improved through making employees feel important, giving them a degree of freedom to make choices and acknowledging their social needs. Women's work improved when allowed decision making whilst men resisted the changes. Group dynamics was important.

The most fundamental and basic four layers of the pyramid contain what Maslow called "deficiency needs" or "d-needs": esteem, friendship and love, security, and physical needs. If not met they will feel anxious and tense. Metamotivation is to describe the motivation of people who go beyond the scope of the basic needs and strive for constant betterment. Physiological needs – In the UAE Metabolic requirements were not met and hence this hindered the ability to learn and develop. Lunch times were inadequate and students were given foods which were not adequate for growing children.

Safety needs - They need physical safety. Safety and Security needs include: Personal security, financial security, Health and well-being, safety net against accidents/illness and their adverse impacts. It was observed in some schools (external to the case study) that basic health and safety, school structure and educational needs were not met. Old methods of studying with sticks were still prevalent. This brought into case the safety of children and hence the demotivation due to fear and anxiety.

Love and belonging - After physiological and safety needs are fulfilled; the third level of human needs is interpersonal and involves feelings of belongingness. This need is especially strong in childhood and can override the need for safety as witnessed in children who cling to abusive parents. According to Maslow, humans need to feel a sense of belonging and acceptance among their peers. Many people become susceptible to loneliness, social anxiety, and clinical depression in the absence of this love or belonging element. This need for belonging may overcome the physiological and security needs, depending on the strength of the peer

pressure. Here we observed the relationship of teachers and students. The interconnection lacked in many cases.

Esteem - All humans especially children have a need to feel respected; this includes the need to have self-esteem and self-respect. Low self-esteem or an inferiority complex may result from imbalances during this level. Psychological imbalances such as depression can hinder the child from obtaining a higher level of self-esteem or self-respect. Deprivation of these needs may lead to an inferiority complex, weakness, and helplessness.

Self-actualization (self-transcendence) - "What a man can be, he must be." This quotation forms the basis of the perceived need for self-actualization. This level of need refers to what a person's full potential is and the realization of that potential. Maslow describes this level as the desire to accomplish everything that one can, to become the most that one can be. This is also the same OBE of the ADEC objectives that '*All children can learn*" stance prevalent in the school which was part of this study. However, there has been much criticism - Wahba and Brudwell found little evidence for the needs. Self-actualization has been criticized as being ethnocentric by Geert Hofstede.It was argued that this suggested Maslow's hierarchy may be limited as a theory for developmental sequence since the sequence of the love need and the self-esteem need should be reversed according to age.

1. **Frederick Irving Herzberg's two factor theory:** This theory, often referred to as "The Dual Structure theory" (1959) studied 200 workers on motivation. He split people into two groups according to Motivators and Hygiene factors. His ideas are linked to job enrichment. He believed motivation is involvement in the unit production and feedback on performance on a range of tasks.

2. **McGregor's Theory X and Theory Y**: This examined how managers' attitudes affect how workers behave, for example, how teachers (i.e. managers) behaved with their students (i.e. employees). His ideas were based on Maslow's and his theory is not motivational. In Theory X a hierarchical structure is needed with narrow span of control at each and every level. If the organizational goals are to be met, theory X teachers rely heavily on threat and coercion to gain their students' compliance and that blame is the

game. One major flaw of this style is it is much more likely to cause dissatisfaction and fear. In theory Y, teachers assume students may be ambitious and *self-motivated* and exercise *self-control*. They believe satisfaction is a strong motivator. For McGregor, Theory X and Y are not different ends of the same continuum. Rather they are two different continua in themselves.

Theory X and Theory Y relate to Maslow's hierarchy of needs in how human behaviour and motivation are main priorities in the environment workplace or classroom in order to maximize output (grades). In relation to Theory Y, the school is trying to create the most symbiotic relationship between the teacher and student, which relates to Maslow's needs for Self-Actualization and Esteem. For Self-Actualization, the teacher promotes the optimum workplace through morality, creativity, spontaneity, problem solving, lack (or minimization) of the effects of prejudice, and acceptance of facts. People must accept that prejudice exists in others even in students, even as they try to minimize it in themselves. Some are keen to learn and some are not. These issues relate to esteem when the teacher is trying to promote each student's self-esteem, confidence, achievement, respect of others, and respect by others.

Motivation is the key to establishing a lifelong love of learning—the type of learning on which Edudemic and Learnist were both designed to inspire. Social psychological research has indicated that extrinsic rewards can lead to over justification and a subsequent reduction in intrinsic motivation. In one study demonstrating this effect, children who expected to be (and were) rewarded with a ribbon and a gold star for drawing pictures spent less time playing with the drawing materials in subsequent observations than children who were assigned to an unexpected reward condition. While the provision of extrinsic rewards might reduce the desirability of an activity, the use of extrinsic constraints, such as the threat of punishment, against performing an activity has actually been found to increase one's intrinsic interest in that activity (this is similar to McGregor's theory X). In one study, when children were given mild threats against playing with an attractive toy, it was found that the threat actually served to increase the child's interest in the toy, which was previously undesirable to the child in the absence of threat. For those children who received no extrinsic reward, self-determination

theory proposes that extrinsic motivation can be internalized by the individual if the task fits with their values and beliefs and therefore helps to fulfil their basic psychological needs. Generally, motivation is conceptualized as either *intrinsic* or *extrinsic*. Classically, these categories are regarded as distinct. Today, these concepts are less likely to be used as distinct categories, but instead as two ideal types that define a continuum (*ibid*).

Motivation has been found to be an important element in the concept of Andragogy (what motivates the adult learner), and in treating Autism Spectrum Disorders, as in Pivotal Response Therapy. Doyle and Moeyn have noted that traditional methods tended to use anxiety as negative motivation (e.g. use of bad grades by teachers) as a method of getting students to work. However, they have found that progressive approaches with focus on positive motivation over punishment have produced greater effectiveness with learning, since anxiety interferes with performance of complex tasks. Social-cognitive models of behaviour change include the constructs of motivation and volition. Motivation is seen as a process that leads to the forming of behavioural intentions. Volition is seen as a process that leads from intention to actual behaviour*(Ibid)*.

2.8 Globalisation and the lack of research

As we now head towards a new era in language development and the new world with the Arab uprising in the Middle East and Africa there has emerged a new challenge. All governments have established a need for an education system which in effect can help their citizens compete on an international stage. However their lies the challenges in its implementation. Based on Mehisto and Asser (2007), Mehisto's (2008, p. 99-100) assessment the key issue addressed is the lack of knowledge of its aims. Before we can even contemplate the use of CLIL a needs analysis must be clearly researched. (Butler: 2005, p233-236; Ruiz-Garrido and Fortanet-Gómez: 2009). This lack of awareness stems from teachers who are not aware of what is needed. For instance, Mehisto (2008) found out that those CLIL classes which were only taught by content teachers featured second language support mostly through

unnecessary translation. This lack of understanding of CLIL and support will be highlighted further on.

In many cases teachers were unsure whether they were content teachers or language teachers which ultimately affected the way they taught. As observed team teaching is one of the downfalls in CLIL (Cammarata: 2009, p 569-574; Coonan: 2007; Coyle: 2007; Coyle, Hood, & Marsh: 2010 p44; Feryok:2008; Mehisto, Marsh, &Frigols: 2008; Yassin et al: 2010). More teacher-related concerns are reported in Pena Díaz and Porto Requejo (2008), whose research project followed the implementation of bilingual-CLIL programmes in 150 primary schools in Madrid.

In order to fully comprehend the concerned interviews, questionnaires and observations were carried out within a specific content. Results showed that by having a better command of English, proficiency was enhanced. (PavónVázquez and Rubio: 2010: p51).In Butler's (2005, p 236) study, it further comments on the fact teachers had a lack of understanding of CLIL. Surprisingly, many teachers lack training on CLIL methodologies and also did not consider they needed such training. (Pena Díaz and Porto Requejo: 2008). In other words a major concern was how to organise pre-service and in-service teacher education programmes that could also contemplate CLIL settings as possible sources of employment for future teachers. Mehisto's (2008) also reviewed that there were many factors that could help in assisting the implementation of CLIL: training opportunities, support by Immersion Centres, and teaching materials were ranked (in that order). Interviews of senior managers unearthed similar findings. Distress as well as resistance to innovation among teachers. This usually happens when implementations occur from the centre to the periphery. (Waters: 2009, p437). Nor is there development of CLIL teacher training programmes, content materials or instructional resources (Lyster and Ballinger:2011, p286;Ruiz de Zarobe: 2008, p62). In Germany, however, in a trend that could be imitated by other countries, universities have started to offer an additional CLIL teaching qualification (Vázquez: 2007, p102-103). Similar initiatives may also be found in Italy (Hillyard: 2011, p8-9). Relevant materials are also a drawback as Ballman (1997: p183-184) claims that publishers need to produce course books that are related to learners'

lives in their contexts and this in turn also implies a greater workload for teachers (Alonso, Grisaleña, & Campo: 2008, p46; Cammarata: 2009, p562; Coonan: 2007, p628; Maley: 2011,p391; Moore & Lorenzo:2007, p28-35; Mehisto, Marsh, &Frigols: 2008, p22; Ricci Garotti: 2007, p134-135; Vázquez: 2007, p103). Another issue is of examinations (Serragiotto:2007). While CLIL looks at, in theory, language and content holistically, national exams (other than language exams) are solely focused on content, creating a fracture in the system.

The main concern here is that there is an urgent need to investigate classroom practice as to what teachers to from CLIL topics and the initial implementation process. Also a lack of rigor may also affect overall CLIL research as the better learners are often placed in these classes and also previous foreign language performance or overall academic grades also dilute the findings. As (Mehisto:2008)adamantly claims stakeholders must adopt a top-down process and focus on faculty development. So that content and language teachers collaboratively teach subject matter for which they have been trained. If this is issue is not addressed then content teachers, who lack linguistic expertise (Vázquez: 2007, p106), may tend to stress content and neglect both ` of CLIL two crucial variables were transparent: motivation and the effectiveness of Traditional Based Education in contrast to Outcome Based Educational (OBE). They will be briefly discussed here; however the motivational theories and OBE will be discussed in relation to CLIL as to its effectiveness or lack of if these twovariables are applied in the evaluation section. There were many other variableswhich will be briefly highlighted upon in the evaluation critique section.

2.9 Outcome Based Education (OBE) and CLIL

The third variant and one of the biggest hindrances that was acknowledged was the system employed by ADEC. The Outcome Based Education (OBE). Their vision that 'all children can learn and will learn' is somewhat flawed as not all students have the aptitude, so how could this be the case (Sunser,1998)? The well-renowned Harvard Professor Anthony Oettinger states writing and maths are not important (*ibid*). This obviously was in relation to the fact that

not everyone should be educated as we need a low-wage pool of labourers (Sticht,1999). Taking this into account, we have to ask ourselves what the purpose of OBE is – is having so many educated people really good for the country? Research carried out in the early nineties suggested that by the year 2000, 70% will not need college education in the USA as there will be a shortage of workers in law-skilled areas. A select amount of core academics are all that a country needs for which they are responsible for the affairs of a nation. This brings into question the whole dynamics of the OBE system and whether it will be beneficial for the nation in the long-run. This will obviously have a massive impact on CLIL in the UAE. There are currently 900,000 Emiratis at a ratio of 1:7 to foreigners working. This means they will need educated people to run the high-end jobs which they are currently lacking at the moment (Emaritisation in 2011 ensured this). The majority of the low-skilled work is done from people from the Indian sub-continent, the Philippines and other poorer nations. The mind-set has to then change and investment in projects such as CLIL have to be given huge significance. At the moment this is lacking, and further investment needs to be made.

For CLIL to work using the OBE system, two elements have to be taken into consideration according to Spady (2008), (1) it has to be time-based to allow students enough time to complete the tasks and that (2) the normal curriculum does not work.

A new paradigm for learning

The OBE method of curriculum design and teaching focuses on what students can actually do after they are taught. This method is also known as *Mastery Education* or *Performance Based Education*.

(1) What do students need learn? (2) Why should they learn it? (3) How can we help them to learn? (4) and how have they learned it? The main objective in the OBE system is that the outcome is addressed first – everything else then supports that (Spady,1988, 1993). In order for it to work effectively, we need to ensure that (1) What needs to be learned is clearly identified, (2) Students' progress is based on demonstrated achievement (3) Multiple instructional and assessment strategies and needs of people to be addressed, (4) time and

assistance is given so that students can achieve. (Towers,1996). There are advantages to this system:

1. Students understand the content of what they have to learn (Spady: 1993),
2. Studentspractise and demonstrate their ability to think, question, research, make decisions, and give presentations. (It is a Complete Course).
3. Relevant – Student mastery at his pace
4. Controversy – why we use, reason etc.
5. Clarity – Framework + Road Maps
6. Accountability – Goals have been met or not
7. Self-directed learning – metacognitive understanding
8. Flexibility – Dictate its own completion
9. Assessment Guidelines – Performance based not time
10. Collaboration in planning – Rounded curriculum
11. Program Evaluation - Skills, knowledge and attitude to succeed

However, after careful consideration and research and its relation to CLIL it is clear that this system is not as effective. Hence,this is the reason that most private schools in the UAE have adopted UK, USA or IB curriculum. Only ADEC schools have modelled the OBE system in the New School Model (NSM 2012-13) and are only now being piloted. History shows that OBE failed in both in the UK and the USA.

The difference is that OBE measures student-centred learning methods that focus on empirically measuring student performance (the outcome) it is also based on Reform Mathematics, Block scheduling, Project based learning and whole language in contrasts to Traditional outcome – based on (INPUTS) resources. This, of course, is where the problem lies and why the students are not achieving to their maximum potential.

CHAPTER 3 **Methodology**

My small-scale inquiry was in one ADEC school only and so current settings have to be taken into consideration. The focus here has not been on the lesson delivery, context, and use of specific resources, as this is a topic which has been widely researched. To investigate this methodological approach, a concurrent triangulation design of mixed methods has been used: pre-test & post-test, based on the topic of handling data (measurement and data) which incorporates scatter graphs, probability or rule, pie charts, time, distance, frequency diagrams, mean, median and mode.

This was a comparative study on the use of the CLIL syllabus versus the use of the ADEC curriculum alone. Units 6.4, 6.5 and 6.6 (grade 6) and units 9.6, 9.7 and 9.8 (grade 9) were covered from the ADEC curriculum. A CLIL syllabus was designed and tested, and an assessment was made on the 3 skills – remembering, understanding/analysing and creating (ADEC syllabus: Pg 22). Questionnaires, semi-structured interviews and observation tools for qualitative purposes were used and questionnaires for obtaining the quantitative data were also collated (see appendices 2-3). Three key variables were therefore summarised:

- Independent variables: *use or non-use of the CLIL approach.*
- Dependent variables: *learning achievement and motivation.*
- Controlled variables: *age group and gender of the students, pre-testing and post-testing, teachers' English proficiency, class size, observation tool, external observer.*

Data has been collated primarily from:

- One Abu Dhabi girls' school Grade 6 and 9.
- Involvement of 58 students, 2 Mathematics teachers, 55 parents and 1 external observer.
- Tests and data analysis.
- Questionnaires and semi-structured interviews.

The research is scheduled for a six month period (Table 3.1).

Table 3.1. The research schedule

Oct-Nov 2012	Literature review and preparing tools
Dec-Mar 2013	Field work, data collection and analyses
Mar-April 2013	Writing up

October 2012-November 2012

- To conduct background research for a literature review of the available academic work concerned with CLIL.

- To establish the actual works on motivation by various authors.

- To analyse the current research data available on Outcome Based Education and first language acquisition.

- To make contact with a School in Abu Dhabi to determine the basis of this research

Dec 12-Mar 2013

To gather data as follows:

- Observation of classroom practice in relevant classes in selected school in Abu Dhabi

- Collation of pre-test and post-test results.

- Delivery of 8 lessons of the four classes A, B, C and D.

- Interview and observations of students, teachers, parents and external observer.

- Other related information and data that may arise

Mar 13-Apr 12: Writing up

- Analysis of the gathered data.

- Production of the draft analysis, dissertation, appendices & references.

- To disseminate the research findings into a coherent document for peer marking and assessment.

- Relevant staff members, tutors, mentors and support staff will be consulted.

Ethical standards are essential to the research process. Researchers have an ethical obligation to protect their subjects and to act responsibly and morally toward them. It is acknowledged that religion and race are particularly sensitive issues in the geographical area of the study and every effort was made to ensure that no offence was offered to any group or individual participating in the study; The ability of individuals to recognise their own or the opinions of others in the final text wasminimised through the anonymity of the evidence presented and the number of subjects and the school involved in the study. This study was conducted accordance with commonly accepted ethical research principles.

In each case ethical considerations were developed in relation to the current school settings, ADEC data, and key personnel. Permissions were sought in each case whilst maintaining anonymity for the use of materials and key data for analysis and this is cogent within the ethical guidelines.

Methodology on the format used in this study:

Table 3.2. Structure of the assessment of the four classes - There were four classes observed

Class	A	B	C	D
Grade	6	6	9	9
CLIL	Yes	Non	Yes	Non

- 1 random sample lesson plan was collected from year 6 class A (CLIL) teacher and Class B (Non CLIL) teacher in lesson 5 out of the 8 lessons taught. (See Appendix 4).
- 1 random sample lesson plan was collected from year 9 class C (CLIL) teacher and class D (Non-CLIL) teacher in lesson 3 of the 8 lessons taught. (See Appendix 9).
- 8 lessons were taught and each class /student had a pre-test and post-test. The data results were recorded. 3 data analysis test were done. Sample of 8 students and a whole class. (See Appendices 5-8).
- Two teachers were observed from the four classes - 2 CLIL and 2 Non CLIL (Data Analysed).
- Two teachers completed questionnaires – one CLIL and one Non CLIL (Data Analysed).

- 29 pupils completed questionnaires from which the data was analysed.
- 58 parents completed questionnaires from which the data was analysed.
- 29 grade 6 & 9 pupils were taught in Non CLIL and both pre-test and post-test were recorded (Data Analysed).
- 29 grade 6 & 9 pupils were taught in CLIL and both pre-test and post-test were delivered in CLIL (English Medium, Data Analysed).
- We used a total of 58 students in this study.

The following data was collated:

- Pre-test and post test results Grade 6 class A – CLIL.
- Pre-test and post test results Grade 6 class B – Non CLIL.
- Pre-test and post test results Grade 9 class C – CLIL.
- Pre-test and post test results Grade 9 class D – Non CLIL.
- Teachers' sample lesson plan, questionnaire and observations.
- Parents' questionnaires.
- Students' questionnaires.

The pre-test and post tests were not that difficult (See Appendix One to four). Each question was based on the level the class was working on average to refrain from biasness of the results. Both CLIL and Non CLIL classes carried out the tests. In between two classes were taught in CLIL and two were taught in Non CLIL.

The researcher has used the ADEC curriculum and assessment strand based on the 3 skills – remembering, understanding /analysing and creating (ADEC syllabus: page 22). Each teacher was acknowledged as having IELTS 6.0+ to give us a better understanding of the level of English medium available. However none of the teachers were CLIL trained. This had an impact on the delivery of the CLIL lessons. The assessment was conducted in term 2 – 2013 in one School only. This school was an average-achieving school In Abu Dhabi.

CHAPTER 4 **Evaluation**

In the ADEC syllabus the cycle 2 Indicators in the *6 Mathematics Curriculum* describe the knowledge, skills, understanding and strategies that students will demonstrate when they have achieved the Standards at the end of each grade.The Indicators are organised into four Strands: Number, Patterns and Algebra, Measurement and Data and Space and Geometry.The cycle 2 Indicators in the *Grade9 Mathematics CLIL Curriculum* describe the knowledge, skills, understanding and strategies that students will demonstrate when they have achieved the Standards at the end of the course.The Indicators are organised into four Strands: Number, Patterns and Algebra, Measurement and Data and Space and Geometry. This also includes the language element.

4.1 Data analysis of CLIL and non-CLIL students' pre-test and post-test results

The pre- and post-test results were compared between CLIL and non-CLIL groups, first within their grades, and subsequently across the two grades in order to compare a larger sample of students. Since the tests for grade 6 and grade 9 were out of different totals (30 and 50 respectively), conversions had to be made in order to be able to make a direct comparison between scores. Hence, all grade 6 scores were converted to a score out of 50 prior to analysis. The data for all students were then formatted into numerical values using a codebook for use with SPSS, and a database was created. This put the data into a format that was easy to manipulate, and allowed for more complex calculations and data analysis than using Excel alone. Figure 4.1 shows a comparison between CLIL and non-CLIL students divided into their grades.
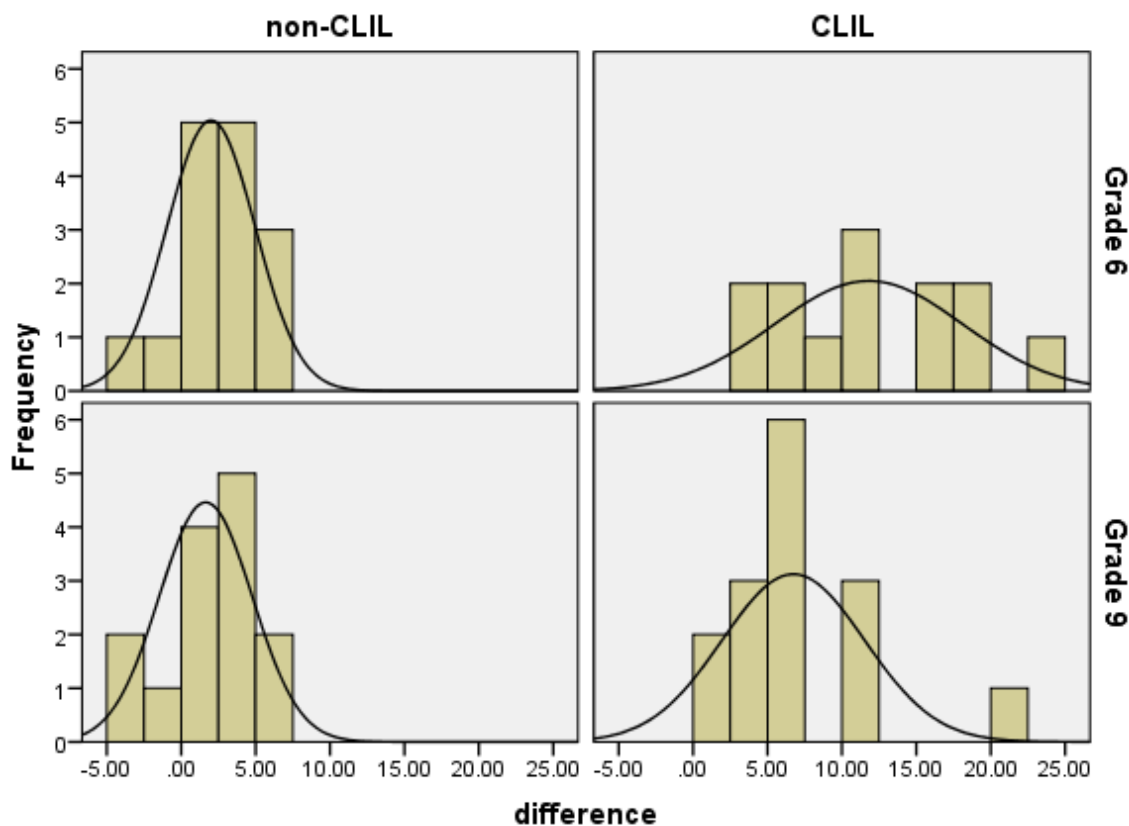
Figure 4.1 Comparison between CLIL and non-CLIL students divided into their grades.

In the third test sample the researcher increased the student performances data to entire classes (see appendix 9). In Data Analysis Three the Grade 6 CLIL student from the pre-test to post-test results shows a significant improvement of 22.1%. In Grade 6 Non CLIL students from pre-test to post test results only a 1.6% increase. The overall difference is 21%. The Grade 9 CLIL students from the pre-test to post-test results show a significant improvement of 13%. In Grade 9 Non CLIL students from pre-test to post-test results only a 3% increase. The overall difference is 10%. In Grade 6 & 9 CLIL combined data results show a 17.8% increase in comparison to Non CLIL data results of 3.2% and overall 14.6%. This shows that on in an average classroom CLIL students performed better than Non CLIL. Again this was random selection of students and limited involvement of the variables.

Table 4.1 Sample test data of a whole class Grade 6 and 9

Class A CLIL Classes Grade 6	22.1%
Class B Non CLIL Classes Grade 6	1.6%
Grade 6 CLIL to Non CLIL Difference	20.6%
Class C CLIL Classes Grade 9	13.5%
Class D Non CLIL Classes Grade 9	3.3%
Grade 9 CLIL to Non CLIL Difference	10.2%
Class A + C Combined Grade 6 and 9 CLIL	17.8%
Class B + D Combined Grade 6 and 9 Non – CLIL	3.2%
ALL Grade 6 & 9 CLIL to Non CLIL Difference	14.6%

Finally the overall comparative of Data Analysis of sample one shows a significant increase of 23.4%. Data Analysis of sample two shows increase of 11.7%. Data Analysis of sample three of whole class shows increase of 14.6%. The variant is between 11.7% to 23.4% with the mean 17.5%. The overall class average difference was 14.6% (Table 4.2). This highlights the fact that regardless of the increase of students the data is comparatively the same.

Table 4.2 Whole class % difference in pre- and post-test scores

Class A + C Combined Grade 6 and 9 CLIL	17.8%
Class B + D Combined Grade 6 and 9 Non – CLIL	3.2%
ALL Grade 6 & 9 CLIL to Non CLIL Difference	14.6%

In order to compare the two groups (Figure 4.2), an independent t-test was carried out to determine whether or not the difference was statistically significant. The data was considered to fit the assumptions required to carry out such a test, for example, the variable is continuous, there is a roughly normal distribution of scores, and scores are independent of one another and of other sources, i.e. the students were not able to consult a textbook or another student during the exam. The t-test, with equal variances both assumed and not assumed, produced a significance value of 0.002, hence the difference is deemed to be statistically significant in favour of the CLIL group.
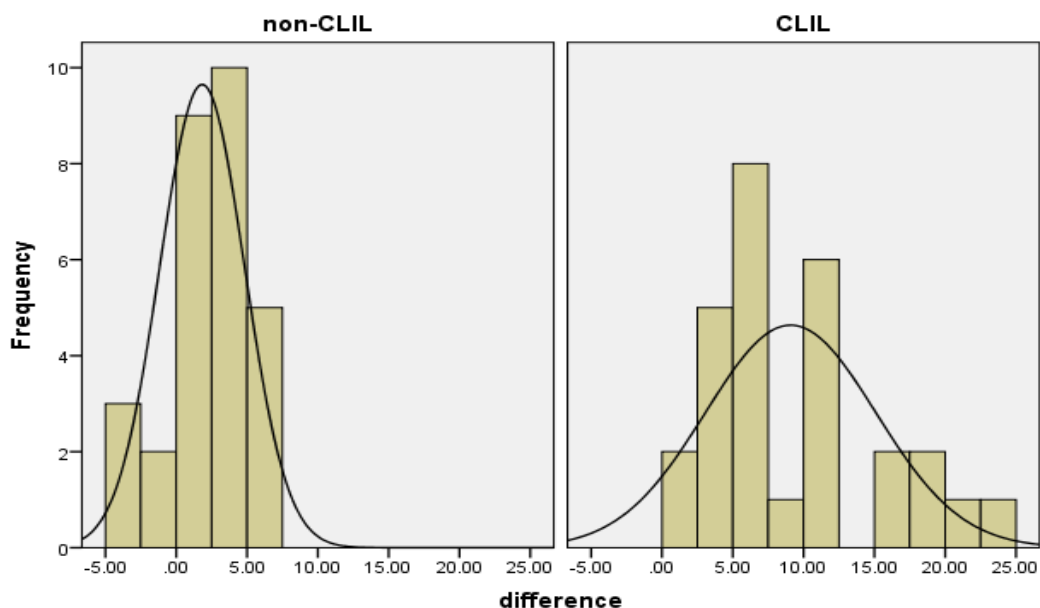
Figure 4.2 Comparison between CLIL and non-CLIL.

4.2 Data Analysis in Questionnaires and Interviews

After completion of all courses, the two participating teachers were asked to complete a questionnaire in order to determine their views and opinions on the course, its successes or lack thereof, and its outcomes. The results show that there is divided opinion on the CLIL venture; however, it was agreed that aiming at young learners is important. It was also clear that CLIL training is essential and that the curriculum should not only be taught through English, but actively and explicitly developing language skills throughout the course. It was agreed that CLIL has problems in assessment and that team-teaching and having greater language competency i.e. IELTS 6.0+ would have a better effect in implementation of CLIL. Only one of the two teachers agreed that CLIL is still a better option even if it were acknowledged that the implementation would be to the detriment of better education and attainment. One of the teachers also stated that it would be better to keep subject-content and EFL separate, as it is easier to teach this way.

There were many weaknesses identified, such as the limited resources, unclear assessment criteria, lack of qualified teachers who have proficiency in English, the need for more course

time, extensive preparation, and knowledge of subject integration techniques. However, there were many benefits identified by the teachers, including language development of student and teacher, skills-based teaching, and critical thinking as well as systematic planning. They also agreed that the CLIL lessons increased motivation to learn both Mathematics and English.

The student questionnaire results show that over half the students supported the CLIL lessons and stated that they were advantageous (Note: the 29 students from non-CLIL lessons also had a couple of taster sessions). The majority of the students did not like the pre-test; however, after the 8 lessons on CLIL they found the post-test more accessible. They were also of the opinion that using a foreign language such as the English medium would impede the content learning, yet the majority did not agree with the fact that if the lessons were taught in Arabic only it would improve learning. Most of the students also understood the CLIL lessons and said they had learned almost everything in the topics taught and had only struggled on some aspects. Overwhelmingly, they enjoyed the CLIL lessons and would definitely recommend the use of CLIL lessons.

In the semi-structured interviews conducted during and after the course by the researcher and the external observer (see appendix, 10), the majority of the students expressed their satisfaction towards the experience as a whole, and also said that they enjoyed and looked forward to individual lessons. Ninety per cent of students said they would prefer to continue with the CLIL course rather than go back to the ADEC curriculum alone, as they feel that the CLIL course used authentic materials and put the content and language into context. Eighty-five per cent of students felt that they would like to study other subjects, in addition to Mathematics, through CLIL. Other notable comments were that students felt more engaged during the classes, that they were able to effectively interact with other students, and that they felt in control of their own learning.

The parent questionnaire results show that, overall, parents viewed the CLIL study to be very good and that there were advantages to using this method (see appendix, 11). Most parents would also like their children to be taught in English in other subjects, but stated they would

have learnt more if they were taught in Arabic only and that using English Medium would impede content learning. Most of the parents acknowledged that the child understood CLIL lessons, and only a minority stated that their child did not understand the lessons well. Some of the materials taken home by the students were difficult for many of the parents questioned to comprehend; however, most of them did state that their children had said they enjoyed the lessons. All the parents recommended CLIL implementation and thought the CLIL method was positive. Over half stated that the only problem with CLIL was that the students needed more time to adapt. The overall remarks were: *'the children are very excited about experiencing new thing'*, *'Children say it is interesting to learn English in other lessons',* and *'Children understand more English and have a chance to practice more, exposed more too English vocabulary. Interesting way of studying.'*

Overall, questionnaire results show that most enjoyed CLIL lessons and there were many positives. They would also like to implement the CLIL method in other lessons and believe that staff need to be trained to deal with CLIL methodology and its implementation. Based on questionnaire results, it appears that the hypothesis is correct that CLIL is hugely beneficial.

4.3 Motivation

The motivation of students was assessed in two ways: through a post-course questionnaire and through observations conducted by an external observer. The questionnaire was a simple, five-question, anonymous checklist which was administered to both CLIL and non-CLIL students in both grades (see appendix 12). To analyse the results, a 5-point Likert ranking scale was used, ranging from 1 ('strongly disagree') to 5 ('strongly agree'). To obtain a 'score' for motivation, numerical values for each answer were added together to calculate a new variable within SPSS.

Figure 4.3 shows the distribution of ranking scores for both CLIL and non-CLIL students. Looking at the normal curves alone, it is clear that motivation was higher with the CLIL students than with the non-CLIL students. This suggests that, in general, learners on the CLIL course found that their motivation level was increased as a consequence of the change.
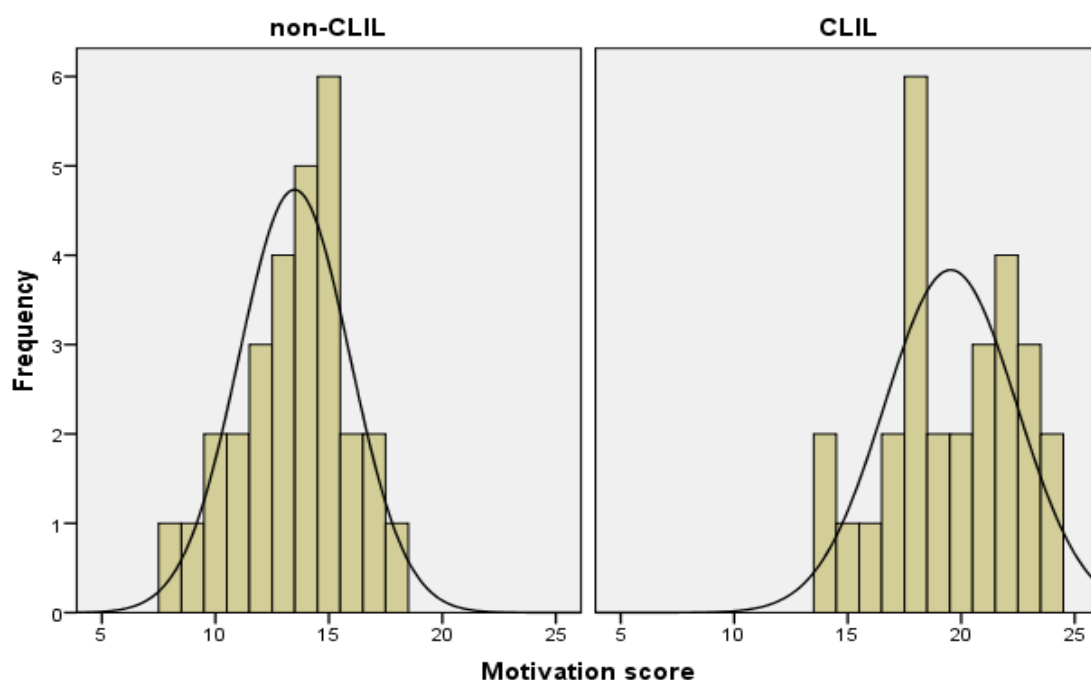
Figure 4.3 Motivation of CLIL and non- CLIL students

Turning now to look at individual questions (see figure 6), it is interesting to note that the most positive answers for both groups came from the question '*I learned a lot of maths during this course'.* Clearly, as this is a mathematics course first and foremost, the subject-content must be preserved however the course is delivered. Therefore, it is reassuring that the use of CLIL did not negatively affect the learning of mathematics in any way. Perhaps not surprisingly, the question with the greatest difference between the two groups was '*I learned a lot of English during this course'.* As can be seen from the CLIL group, the students' felt that they were learning English almost to the same level as mathematics, hence the gain from the CLIL lessons could be seen to be twofold. On the whole, for all questions, the CLIL group answered more positively than the non-CLIL group, and motivation from the students' point of view was clearly much higher in the former.
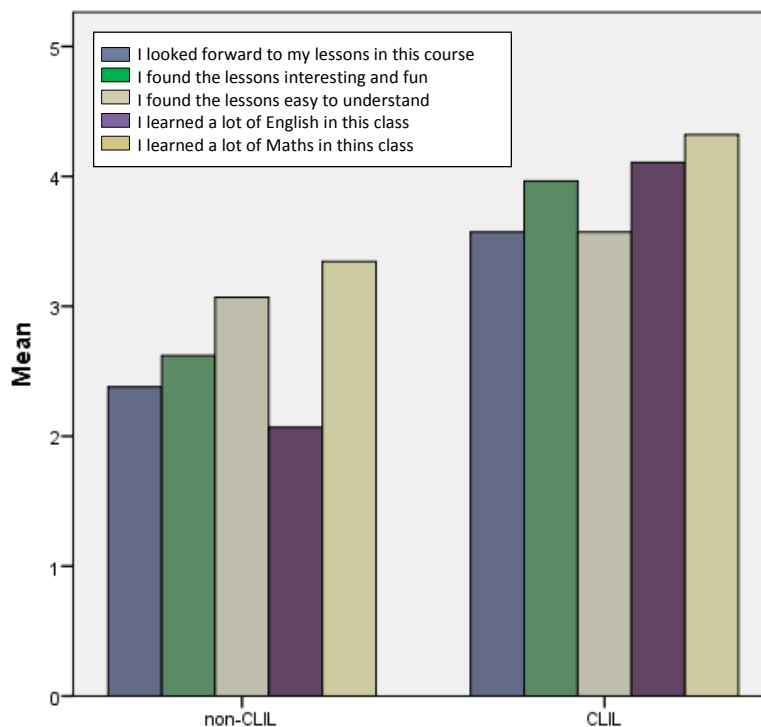
Figure 4.4. Motivation of students by individual questions

In addition to the student questionnaire, follow up interviews were conducted at various stages of the course with the external observer and the researcher to check the level of motivation based on the five theories outlined in the literature review. It was noted by the observer that learners in the CLIL group, on the whole, were much more actively engaged in the lessons than those in the non-CLIL group. As found in the student interviews, the observer commented particularly on the fact that the CLIL lessons put both the content and the language into a context that the students could directly identify with; this assisted with activating schemata and appeared to spark students' interest in the subject and allow them to actively contribute and participate at early stages of the classes.

CHAPTER 5 **Discussion**

Throughout this region, educational institutions are striving to put a reemphasis on the value of the teacher's role in learning, therefore they are creating more opportunities to enhance this role through development of their teachers and teaching practices (Albulushi *et al*, 2008). As part of their ongoing professional development to support these changes, UAE core subject (mathematics, science and ICT) teachers are expected to work towards achieving a target of band 5.5 (overall) on the IELTS Academic exam, and one of English Advisors' role within schools is to help them to attain this band. Given that the reason behind ADEC's IELTS requirement is ultimately for teachers to improve their use of English in the classroom, thus improving the students' English language as well as subject achievement.

The target teachers for this study are Arabic-speaking teachers of mathematics working in UAE government schools in Abu Dhabi. Their students are in grades(6-9)who are also learning English in school but their L1 is Arabic.

Clearly, teachers' professional development is vital to the successful education reform in the UAE (Maffini, 2010). As an English language teaching professional, it was clear to me that simply asking teachers to teach and use materials that are in their L2 is more complex than just learning English as a second language. I felt very strongly that a link had to be made explicit for these teachers between how they were taught in their English language lessons and how they taught their own students. I felt that they had to be aware of, and make allowances for, the difference between simply teaching *in* English and teaching English.

There was also a certain sensitivity with which we had to approach the teachers – as some of them (quite rightly, perhaps) said to me at various times during the implementation of the new curriculum – 'I don't teach English, I teach mathematics. Let the English teacher teach them English!'

The purpose was to show them that there are ways to get English into the classroom in a functional way that supports the content rather than detracts from its teaching. I sensed that, though some of these teachers had spent years in L2 classrooms themselves as students, they (naturally, as mathematics teachers) had never considered the teaching strategies that are specific to L2 classrooms. I had also spent the previous 2 years working closely with Content and Language Integrated Learning (CLIL), and wanted my teachers to see first-hand how content and language can truly be integrated. I also wanted to show them how, by using just a few simple strategies while designing materials and while teaching, student attitudes and motivation can increase significantly, student achievement is improved, and also that it can be informative, productive and enjoyable for the L2 teacher.

As part of this study we looked at how CLIL lessons were taught and how teaching and learning took place. The planning and preparation was integral as was the use of resources and we hoped that the teachers were aware of the CLIL methods. From Appendix 4, the four lesson plans that were submitted were nowhere near adequate and this brings the whole question of the effectiveness of CLIL in the lessons that were part of this study. Even though teachingand learning techniques were evident within the classroom, the implementation of CLIL was minimal. This refers back to Mehisto's theory that one of the primary reasons for CLIL to be a success was that staff have to be CLIL trained. However, increase in attainment did show even though the staff were untrained in the use of the English medium and CLIL (note: the pre-test/post-test papers and briefing on CLIL techniques was given to staff members prior to the study and no support was given during the 8 lessons taught). The hypothesis is still clear that CLIL, even with lack of training, minimal use of motivation techniques, and the use of the OBE system still hugely improved attainment levels. We now hope and contemplate: If all the variables were made available, how much success could we have attained? A larger study of cohorts in the Middle East in varied schools from K1-12 would be the next step.

One of the momentous research findings in this particular studyis the effectiveness of CLIL in developing gifted and talented students. From observations, it was apparent that some

students are naturally gifted and this was reflected in the pre- test and post -test data results as well.

Sample results data shows that there are 3 gifted children in class A and in Non CLIL there were 2 gifted students (Table 5.1). Sample results data shows that there are 9 gifted children in class C and In Non CLIL there was 1 gifted student identified (Table 5.2).

Table 5.1 Sample test data with 4G & T students from each class A and 3 from Class B Grade 6

	Class A – CLIL					Class B - Non CLIL				
Student	(pre-test)	(post-test)	Analysis	% marks	% +/-	Student	(pre-test)	(post-test)	Analysis	% Marks	% +/-
6	20	27	7	90%	23.3%	5	20	23	3	77%	10.0%
7	21	26	5	87%	16.7%	13	19	22	3	73%	10.0%
9	20	29	9	97%	30.0%						

Table 5.2. Sample test data with 9 G & T students from class C and 2 from Class D Grade 9

	Class C - CLIL					Class D - Non CLIL				
Student	(pre-test)	(post-test)	Analysis	% marks	% +/-	Student	(pre-test)	(post-test)	Analysis	% marks	% +/-
1	44	48	4	96%	8.0%	7	42	42	0	84%	0.0%
2	40	42	2	84%	4.0%						
7	42	47	5	94%	10.0%						
8	34	45	11	90%	22.0%						
10	40	44	4	88%	8.0%						
11	35	40	5	80%	10.0%						
13	38	40	2	80%	4.0%						
14	35	41	6	82%	12.0%						
15	30	40	10	80%	20.0%						

From the four classes used for our test case it was observed that there were gifted and talented students in the 4 classes. The sample results data shows that in Grade 6 there were 3 gifted children in class A with one exceptional student who has a 30% increase and a score of 97% due to the CLIL lessons. In the non CLIL class B there were 2 gifted students; however, their improvement was also 10%. With the support of CLIL they could have possibly achieved higher results. This proves the hypothesis that CLIL lessons hugely improve learning especially with G & T students. In Grade 9 the sample results data shows that there are 9 gifted children in class C with two exceptional students who attained 96% and 94% with an 8% and 10% increase respectively due to the CLIL lessons. In the non CLIL class D there was 1 gifted student identified. However there was no improvement in his results. With the support of CLIL he could have possibly achieved higher results. This proves the hypothesis that CLIL lessons hugely improve learning.

Renzulli, Smith, & Reis(1992) confirmed that natural abilities or aptitudes act as the "raw materials" or constituent elements of talents. These natural abilities were clearly visible in the classes observed and the planned activities that set higher targets to engage gifted students in systematic learning and practising. It is also important to note from our data results that some G & T students had a huge increase in attainment in the CLIL lessons whilst other non CLIL students did not fare as well.

In this study the DMGT model was used as a basis to determine key factors in gifted and talentedness and its correlation to CLIL. Many sources are required for this talent to emerge. These include motivation, perseverance, supporting parents and teachers, as well as long-term investment in learning, training, and practicing. As shown in appendix 14, the *DMGT* brings together six components: gifts (*G*), talents (*T*), the talent development process (*D*), intrapersonal catalysts (*I*), environmental catalysts (*E*), and the chance factor (*C*), they can be grouped into two distinct trios: (a) the talent development trio (*G, T, D*), and the 'supporting cast' trio (*I, E, C*).The DMGT is a talent-development model. It does not pretend to represent a person's total personal development. Within the DMGT framework that teachers' used in the study as a result of recommendations provided by the observer, goals placed for the higher

achievers in the CLIL class required intense dedication, as well as daily acts of will power to maintain practice through the obstacles otherwise will result in boredom, and occasional failure. Consequently, only elements that have a significant influence on a person's talent development process should be introduced. Any case study of a person's talent development should exclude any I or E characteristic judged causally irrelevant for the emergence of the student's outstanding achievements. It is also important that G & T students need lessons with high enrichment programs and these can take four different forms: Density, Difficulty, Depth, and Diversity: the *'four Ds of enrichment'* (Gagné, 2007). Density is sometimes called curriculum compacting, which means it is important to challenge the students who are gifted.

In the CLIL lessons we saw from the sample data that there were many gifted students. However, in our study, no such enrichment program existed in the same scheme of work. Maybe it would have been more beneficial for students of G & T to be fully taught by the CLIL methods in our context. However, this would be difficult in the UAE as Abu Dhabi Education Council (ADEC) uses the outcome based education (OBE) system. Giftedness is determined by screening and assessing (Figure 5.1).
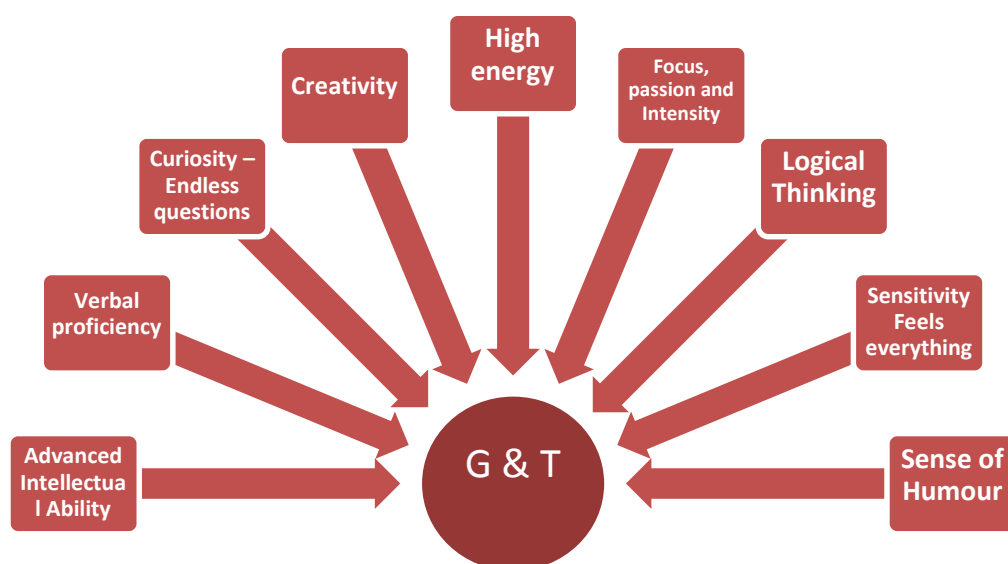

Figure 5.1. Nine ways to determine if a child is gifted.

The author spoke to some of the parents on this aspect during the interviews and it was clear that parents were unaware of the above traits. This also appeared to assist the CLIL classes as the goals of the CLIL study were explained. Finally, *"As a parent, you're part of the single largest power-wielding group in the school system, more powerful than teachers or administrators."*(Walker, 2006).

During the study, four lessons were observed(see Appendix 13)by an external ESL advisor to prevent biased interpretations. The observations were scheduled a few days in advance to reduce the chance of artificially 'enhanced' lessons. Both Grade 6 and 9 CLIL and non-CLIL classes were observed. During these lesson observations the observation tools were left to the discretion of the observer. However, this was a format which we later revised but was not implemented due to the time constraints. An observation tool similar to that of the University of San Jorge should have been used which is more CLIL based (see Appendix 13).

Furthermore, there was space to note additional tools of CLIL as explained in the rest of the theory section, such as pupil motivation, G & T, SEN and other variant factors. After each class, the observer would question the teacher to validate the value of the observation. These questions were the following:

1. *What strategies did you use? Did you adapt them for this lesson?*
2. *How was student engagement, use of mathematics, ICT? Was this different to any other lesson?*
3. There are few points to consider in the second section. Would you adapt these in future lessons?
4. *The feedback sessions suggests a few ideas that can be looked at. Do you agree?*

Observations were conducted across two grades, 6 and 9, and two classes in each grade, yet there are some similarities between all lessons. There were many concerns as the lack of CLIL training was clear. Even though, we did use the scaffolding method as below:

Scaffolding language to support content

'Scaffolding' (سقالة) is something that we can do with language to support learning. Just as a new building needs support at the beginning, our students' English needs a lot of support at first, especially because the subject content (science or maths, etc.) needs to be fully understood.

Just like with a new building, we slowly take away this support as it gets stronger. As our students get better at English, we can take away the language support we give them.

Scaffolding introduction from a school teacher guidebook

However, in order for CLIL to be fully effective, training was necessary. There were benefits for all teachers as they adapted their language to the pupils' level. Teachers also asked questions of pupils to determine if they understood the lesson content. Additionally, most teachers addressed difficult words or new terminology to some extent. Some teachers explicitly correct or explain language functions that play a role in their subject area. In all classes, pupils were given time to work on their own or in pairs in the target language.

It is worth noting that pupils have a tendency to speak Arabic when working in pairs or groups. This is proportionately corrected at times. None of the teachers stated to have actively created or adapted lesson materials used as they relied upon books, which is usually the norm in schools. This showed either a disinterest or a lack of awareness of this important aspect of CLIL theory. On the whole, both teachers displayed some CLIL strategies in their lessons. The observations also clearly identified the 'The Translation problem' where many teachers' solution is to speak to their students in English and then to translate into Arabic immediately after to accommodate the students who are weaker in English and may not have understood. That way, in their opinion, they are meeting ADEC's requirements by delivering all content in English, but ensuring that all students have understood. Inevitably, this results in most learners 'tuning out' the English as they wait for the Arabic translation. Similarly, in dual-language worksheets or tests, students are extremely likely to ignore the English and read the Arabic; this was also confirmed by the students. This of course was a huge problem. This was reflected in the interviews. Most of the lesson elements that are considered CLIL have been implemented unconsciously and are a part of the bilingual teaching style. Teachers are unable

to refer to possible additions of CLIL to their lesson, indicating unawareness of CLIL theory or teaching strategies. The CLIL elements presented could be labelled as 'subconscious CLIL use' as the teachers indicated in interviews, rather than a conscious effort to apply CLIL. This was also the case in our study as some students naturally displayed extrinsic motivation but some were also motivated within.

In our case study this was clear evident that giving the students freedom of choices and allowing them to be valued played a significant role in allowing the CLIL class to perform better. The variation of the lesson was also clear. Further investigation however will need to be done in a girl's school context and maybe they will differ in results.

A key element is the Importance of Communication – through formal structures such as appraisals or one-to-one interviews, acknowledging students through awards, and motivation via training and development. If we were to follow Mayo's theory of motivating students then, would the above be allowed? It would be important to determine whether or not the lessons show clarity, whether all students would understand, and how this would be assessed. In addition, one must consider whether students would be comfortable working as part of a team, and if they would actually be interested in and benefit from the work of others, particularly from more gifted students who produced exemplary work. The role of the teacher should also be considered in terms of the level of student involvement and how much input into teaching and decision-making the learners are given. The teacher should ensure that work is not repetitive in order to prevent boredom and should make every effort to involve all students so that they feel involved and important. Links should also be made to their social life and needs, and group dynamics must be acknowledged as boys and girls tend to learn differently. Many questions need to be addressed. This is something which will need further exploration. Due to limited scope, not all of these questions were answered. We did however use motivational theories in later classroom context and this did increase attainment.

Using Maslow's theory, we extracted many flaws: not all hierarchical entities exist, rewards are on more than one level, individual level recognition is difficult and self-actualisation is not permanent. This was the case in our study where some students excelled regardless of the environment (E) and intrapersonal (I) catalysts (see DMGT model). We identified that some students did not achieve as we would like them to have. This was due to many variables. Some of the needs were met and others were not (Figure 5.2).

The teachers applied this theory in the CLIL lessons. Focus was on group work and in each group due to exceptional work; one student will be assigned as a leader *(promotion and recognition)*. In some cases the leaders of the groups excelled these were usually the G & T students. However this was not the case with the lower ability students and hence hygiene factor was used to motivate them. In other words three levels of work were given to the lower ability students. They cruised through the first two levels and this built their self-esteem and prevented dissatisfaction. Extrinsic motivation was also used in aid of prizes, stickers, stars and rewards.
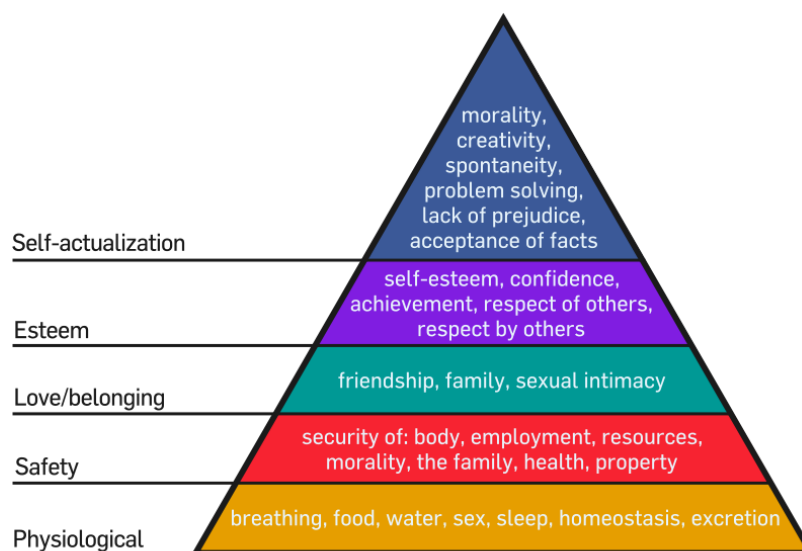

Figure 5.2. Maslow Hierarchy

Other theories which expanded and extended those of Maslow and Herzberg included Kurt Lewin's Force Field Theory, Edwin Locke's Goal Theory and Victor Vroom's Expectancy theory. These tend to stress cultural differences and the fact that individuals tend to be motivated by different factors at different times. This is possibly also evident in this case study as different factors motivated different students. It is up to the teacher to unearth this factor and then utilise the CLIL method to further enhance their learning.

In *Essentials of Organizational Behaviour*, Robbins and Judge examine recognition programs as motivators, and identify five principles that contribute to the success of an (student) incentive program:

  – Individual differences recognition

  – Student participation

  – Performance related rewards

  – Rewarding of nominators

  – Recognition process visibility

In other words, if we acknowledge the above we can determine on a small scale level whether the students were motivated or not. Another theory that we used is Games motivation – can we use games to motivate students? Jon Radoff has proposed a four-quadrant model of game play motivation that includes cooperation, competition, immersion and achievement. The motivational structure of games is central to the gamification trend, which seeks to apply game-based motivation to learning applications. Here at the end of each lesson (5-10 minutes)students applied what they had learned in the form of games: *The Weakest link*, *Deal or no deal*, pass the ball, or team trials. This definitely made teaching and learning fun.

In this study we used key Motivation techniques which can be divided into two types: intrinsic (internal) motivation and extrinsic (external) motivation. Intrinsic motivation refers to motivation that is driven by an interest or enjoyment in the task itself, and exists within the individual rather than relying on external pressures or a desire for reward. Students are likely to be intrinsically motivated if they: attribute their educational results to factors under their

own control, also known as autonomy, believe they have the skills to be effective agents in reaching their desired goals, also known as self-efficacy beliefs are interested in mastering a topic, not just in achieving good grades. This was clearly evident with the G & T students. Extrinsic motivation refers to the performance of an activity in order to attain an outcome, whether or not that activity is also intrinsically motivated. Extrinsic motivation comes from outside of the individual. Common extrinsic motivations are rewards (for example money or grades) (www.edudemic.com/2013/02/resources-for-motivating-students).

CHAPTER 6 **Recommendations**

There were also many reflections the researcher pondered upon. It is believed that this research would have benefitted from some additions or alterations: a roundtable session with pupils; observations of lessons prior to the study; staff training and comparison with the variables aforementioned. A pupil roundtable would have given more insight into pupil perception of bilingual education and CLIL in action. Prior observation of lessons would have allowed for direct comparison between teaching prior to and after the CLIL learning sessions. The researcher personally attending the CLIL sessions would have allowed for first-hand evaluation of the process and value of these sessions.

The Senior Management Team or English Teaching Assistants can do several things to ensure effective CLIL use in the coming school year. First and foremost, the team can make use of the knowledge within their ranks: English teachers can play an important supportive role; there is a wealth of experience and practical examples to be shared amongst the teaching assistants, and there need not be a heavy emphasis on guest speakers or external courses; teachers need to share the responsibility for improving and maintaining CLIL; theoretical and practical resources should be readily available and accessible to all teachers to support CLIL understanding and its practical application.

English teachers can and should play an important role in supporting subject teachers in their use of CLIL. The language acquisition strategies that English teachers use in their lessons are particularly applicable in the CLIL classroom, and this is one easily accessible resource that can strengthen the schools' use of CLIL. CPD training given by English teachers, or a structured opportunity to approach these teachers with questions, would allow other subject teachers to tap this knowledge. Collaborative practices within the school and possibly other local schools could create a healthy teaching and learning CLIL practice which would benefit all as such, the emphasis does not have to be on guest speakers or external courses in CLIL. If there is a clear understanding of CLIL at least for some of the teachers, a sharing of their experiences and

understanding with less experienced teachers will go a long way to emphasizing and applying CLIL methods. In order for CLIL improvement and maintenance to be effective, teachers need to make it a team goal and responsibility. An individual approach will not be as effective, as it would ignore the most valuable asset available: the supportive potential of the other team members.

Theoretical and practical resources should also be available and accessible to all teachers. Reading materials on CLIL theory, video analysis sessions of best-practice examples from outside and within the school, and peer-observation using specific CLIL observation tools could improve understanding of CLIL and increased awareness of CLIL in action. The feasibility of these prescriptions depends on the teachers: without their effort and dedication CLIL teaching strategies cannot take hold. Furthermore, such strategies are not exclusive to any particular school: they apply generally to all schools.

CHAPTER 7 **Conclusion**

As we conclude our investigation on the effectiveness of CLIL in improving second language competency in an intermediate school in Abu Dhabi, it is important that much research has been focused upon the two key variables: motivation theories and OBE. Other variables such as SEN, competency of CLIL staff, resources, training and development have been only touched upon. Although these variables are fundamental and should therefore be further analysed, it is still important to shed light on other variables. This study does have its limitations. The lack of CLIL training of teachers has had a huge impact on the effectiveness on CLIL lessons and has been much criticised. This may have been due to the teachers not being comfortable with the use of English. This may also have impacted on the students in the long run.

The results data clearly shows that those students who were taught by the CLIL method, the teachers who taught CLIL lessons and parents that were involved acknowledge CLIL to be hugely beneficial even though the variables were limited, time scales were also restrictive and only four classes were observed. Although this study has some limitations due to the amount of students involved, lack of CLIL resources and trained staff, it still yielded conclusive results. Having to learn English in the traditional format throughout all their educational lifetime can be demotivating for learners (Chambers 1999; Davies and Brember 2001; Williams *et al*2002), whereas the focus on both content and language promoted by the CLIL format (Coyle 2008; Marsh 2008) seems to sustain motivation and this was also clearly evident from this study. The use of CLIL has also increased both the aural and written skills of the students involved. However speaking skills varied and could not be substantiated as the research was over eight lessons only. This does not give us enough time for assessment on the effectiveness on the speaking aspect. If the improvement in the oral format is to be more definitive, more time will be needed so that the beneficial effects of CLIL are more salient.

The findings seem to be particularly informative when the correlations between CLIL and the variables are considered. The reason for the lack of correlation between the variables is due to

limited scope - this need further investigating. Nevertheless, this did have an impact. More research is needed to get to know whether a lack of contact with the target language community limits foreign language learning or not. Another question to bear in mind when comparing the two groups is the total contact time of eight lessons. CLIL students did not only have English classes, but also the influence of mathematics which is taught in English. This means other subjects could have different results; again, this will need to be investigated. From the research we believe the results will be similar. The grade 6 and grade 9 students' data results also may have some differences in a larger context as grade 9 students have had more exposure to the English language over four years. Their subject knowledge is also greater as well as their understanding being superior. These results cannot be generalised, because the implementation of CLIL hinges on so many variables, such as learning styles, learner characteristics, teacher personality, composition of the class group and degree or type of support.

In other diverse educational settings the effectiveness of CLIL needs analysing, more in depth research would make it clear on the hypothesis and either corroborate or challenge the present results. A new concept by Dornyei's (2009) study on motivation has started to investigate learner identities and this is something that needs considering. Any further study needs to take this new theory (called the L2 Motivational Self System) into account, since it has considerable practical implications.

There is certainly much opportunity for improvement and expansion of this study, although time-constraints within the environment of a busy school limit our chances to do this. However, in addition to the above, there are definitely elements that we did not include in the study that could be incorporated into the next study in the future. For example, Perez-Vidal (2007) emphasises that CLIL approaches show significant concern for meaning, and have less of a focus on form which, she believes, needs to be increased if students are to be successful in learning a subject through L2. Our study, if we were to expand it, should perhaps take this into consideration, though teachers less proficient in L2 may find this difficult, and any mathematics or science teacher may feel that this is not their responsibility.

Finally, our research attempted to shed the light on many pedagogical implications. *Euro barometers* (surveys conducted on behalf of the European Commission) highlighted that over half of European students in full time education finished with unsatisfactory language skills. This means that if they have not completed the necessary language skills, this would have an impact on later life. The pedagogical conclusion of this present study is clear. CLIL programmes should be implemented in the mainstream educational environment as they exert a very positive influence on learners' motivation, which goes hand in hand with increased foreign language achievement. CLIL methodology is motivational, especially for the new students who have spent time learning English in accordance to the New School Model (NSM). The current results seem to indicate that the tasks completed in a CLIL context generate more positive responses in contrast to non CLIL context. The limitations of the present study also have to do with the impossibility of specifying the reasons behind students' demotivation in the non CLIL context, in contrast to the higher motivation in the CLIL programmes - this also needs further research. Consequently, in-depth interviews may become an effective and complementary way to explore the dynamics of students' motivation. The implementation of qualitative research is of the utmost importance on a larger scale, as it will help researchers to pin-point how the variables can be increased, and therefore, how to improve the foreign language learning process.

Analysis of the effect of different variables and their approaches will allow researchers and academics to paint a clearer picture of what actually happens in the classroom, therefore the dynamic character of how the foreign language-learning process can be boosted and improved. In this respect, CLIL is a powerful tool, though more studies are needed to identify all its potentialities (as well as its weaknesses). In any case, it can be concluded that the results obtained in this study seem to indicate that CLIL causes attainment levels to be not only sustained, but also even improved within a formal learning situation such as school, and this is undoubtedly worth examining in more detail. The results forwarded in this study are of interest to stakeholders in many and varied contexts, since CLIL programmes are burgeoning globally and this trend demands empirical evidence on how CLIL can further be enhanced and implemented. *(Word count: 15601)*

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Appendix 1

Curriculum Guide

ADEC Mathematics

مجلس أبوظبي للتعليم
Abu Dhabi Education Council
Education First التعليم أولاً

Cycle 2 and Cycle 3

INDICATORS (CYCLE 2)

The Indicators in the **Grade 9 Mathematics CLIL Curriculum** describe the knowledge, skills, understanding and strategies that students will demonstrate when they have achieved the Standards at the end of the course. The Indicators are organised into four Strands: Number, Patterns and Algebra, Measurement and Data and Space and Geometry.

	Number	Patterns and Algebra	Measurement and Data	Space and Geometry
	By the end of the grade, students will be able to:			
Content aims	• **COMPARE**, order and calculate with whole numbers of any size and recognise the properties of special groups of whole numbers and apply a range of strategies to aid computation • **COMPARE**, order and calculate with decimals, simple fractions and simple percentages and recognise chance in everyday events	• **CONSTRUCT**, verify and complete number sentences and record, analyse and generalise number patterns using words	• **SELECT** appropriate units and perform calculations with length, area and volume • **CONSTRUCT**, read and interpret timelines and timetables and perform calculations using time • **CONSTRUCT**, read and interpret graphs, tables and statistical information	• **CLASSIFY** angles and classify, draw and determine the properties of triangles • **IDENTIFY**, sketch and construct three-dimensional objects on the basis of their properties
Language element	• **Vocabulary & Grammar** language for sequencing and ranking, vocabulary for addition, subtraction comparative and superlative forms • **Speaking & Listening** responding to questions about comparing and contrasting group ranking tasks, justifying decisions and choices • **Reading & Writing** text-based presentation of context for probability (authentic material) use of graphic organisers to compare and contrast sequencing and organisation in writing	• **Vocabulary & Grammar** terms for verification, justifying choices, sequencing and making inferences about patterns and themes. • **Speaking & Listening** pair and group discussion of patterns number sequences presented in audio with 10 second pause between numbers running dictation for number sentences • **Reading & Writing** written explanations for patterns found writing an overview of data model texts for the above with figures and language features highlighted	• **Vocabulary & Grammar** language for more complex calculations imperatives (for procedure) adverbs of time and time expressions. past simple for talking about completed events vocabulary to describe change and trends in data • **Speaking & Listening** jigsaw listening on timetable giving and following procedure • **Reading & Writing** writing an overview of data (revised) scaffolded gap-fill for data interpretation report writing	• **Vocabulary & Grammar** functional exponents for classification present simple for facts/general truth prepositions of place • **Speaking & Listening** *What am I?* activity to name shapes based on properties *Describe-dash-do* activity for prepositions and shape/space/dimension • **Reading & Writing** text-based presentation of house dimensions writing a letter of request (house quotation) the never-ending story

Content and Language Integrated Learning (CLIL) in Mathematics

The purpose of the questionnaire is to collect data about the attitude, experience, and needs of Maths teachers employing CLIL in their lessons.

1. Are there downsides of the CLIL venture?
   Yes   no   I don't know

2. Is aiming at young people who have high standards of both the language and the academic study the route for CLIL?
   Yes   no   I don't know

3. Is training the trainers the first step in the implementation of CLIL?
   Yes   no

4. Is curriculum from teaching through English or teaching in English the best way to implement CLIL?
   A (Through English only)   B (Teaching in English)

5. Do you think there should be political backing or support for CLIL?
   Yes   no   I don't know

6. While there are advantages in bringing content and language together for the teaching and the learning, there are real problems for assessment do you agree?
   Yes   no   Other

7. Some people are brilliant academics and teachers yet struggle with English mastery. What should be the best method to combat this?
   Team teaching   IELTS 6.0 is a minimum requirement
   Coaching   Does not matter as long as the pupils understand

8. Do you think CLIL should be implanted at University level?
   Yes   no   other

9. Do you think there are psychological effects or cognitive effects or both with students involved in CLIL?
   Psychological only   cognitive only   both   others

10. Why only English, data shows that in Hong Kong those who learnt via Chinese medium excelled better. Do you think still it should be only in English or other mediums as well or both?
    English only   other mediums   both

11. Are we depriving our students of a choice for better education, while on the other hand we're talking about the economic benefit of CLIL?
    Yes   no   I don't know

12. Would you say focus on EFL is better that CLIL?
    Yes   no   maybe

13. Would using CLIL have a cultural shift pattern or biasness?
    Yes   no   maybe

14. What weaknesses do you anticipate in the implementation of CLIL?
    _____
    _____
    _____
    _____

15. What benefits do you anticipate in the implementation of CLIL?
    _____
    _____
    _____
    _____

Appendix 3

Content and Language Integrated Learning (CLIL) in Mathematics

The purpose of the questionnaire is to collect data about the attitude, experience, and needs of Maths teachers employing CLIL in their lessons.

1. How is your experience with CLIL overall?
   Very good   good   fair   poor

2. Are there any advantages do you think?
   Yes   no   maybe

3. Did you like CLIL (pre test)?
   Very good   good   fair   poor

4. Did you like CLIL (post test) after 8 lessons?
   Very good   good   fair   poor

5. Would you like to be taught English in other subjects
   Yes   no   maybe   depends on subject i.e

6. If you had learnt measurement and Data or current lessons in Arabic would It have benefitted you even more?
   Yes   no   maybe

7. Do you think that Maths learning would be more difficult by being taught in a foreign language?
   Yes   no

8. Did you understand the subject that was taught using the CLIL method?
   Everything   most   not much   almost nothing

9. "How well did you learn the subject content topics that you studied in English?"
   Very well   well   not so well   not at all

10. What did you find difficult in the CLIL lessons?
    Everything   Most of it   Some of it   All of it

11. Did using CLIL motivate you?
    Yes   No   Not sure

12. Would you recommend the use of CLIL?
    Yes   No   Not sure

Appendix 4 Teachers' Lesson Plans

Subject	A CLIL Maths
Concepts and skills:	• **COMPARE**, order and calculate with whole numbers of any size and recognise the properties of special groups of whole numbers and apply a range of strategies to aid computation • **COMPARE**, order and calculate with decimals, simple fractions and simple percentages and recognise chance in everyday events
Topic/Theme	Numbers
Resources needed	PowerPoint-whiteboard-worksheets-students notebooks-pencils.
Context	Every day Maths.
Language Structures	• **Vocabulary & Grammar** language for sequencing and ranking, vocabulary for addition, subtraction
Vocabulary and functions	Words of comparative and superlative forms
Listening	responding to questions about comparing and contrasting group ranking tasks, justifying decisions and choices
Reading	text-based presentation of context for probability (authentic material)
Spoken production	Use the words of comparison to describe, define and explain measurements
Spoken interactions	Use guiding expressions and phrases to summarise the results of an activity and the students' discussion about it. How the expressions can be used.
Writing	use of graphic organisers to compare and contrast sequencing and organisation in writing

Appendix 5 Results from students questionnaires

(See Appendix 3 for questionnaire)

Questions	Students Questionnaire results	Results	Questions	Students Questionnaire results	Results
	Very Good	17	6	Maybe	7
1.	Good	6		No	16
	neutral	3			
	Poor	3		yes	6
2.	yes	16	7	yes	19
	Maybe	3		No	10
	Good	5	8	Everything	16
3.	Fair	10		Most	7
	Poor	12		Not much	6
	Very Good	2	9	Everything	15
	Very Good	14		Most	9
4.	Good	8		not so well	5
	Fair	5	10	Some of it	22
	Poor	2		most of it	7
	yes	15	11	Yes	25
5.	Depends on Subject	6		Not Sure	3
	No	3		No	1
	Maybe	5	12	yes	24
				Not Sure	4
				No	1

Appendix 6 Results from parents questionnaires

Questions	Parents Questionnaire results	Results	Questions	Parents Questionnaire results	Results
1	Very Good	20	7	Well	21
	Good	9		Very Well	11
	Fair	6		Not so Well	3
2	Yes	25	8	Some of it	26
	Maybe	7		Most of it	8
	No	3		Everything	1
3	Yes	28	9	Yes	28
	No	4		Not Sure	5
	Maybe	3		No	2
4	No	23	10	Yes	30
	Yes	4		Not Sure	3
	Maybe	8		No	2
5	Yes	19	11	Yes	34
	Not Sure	11	12	Positive	27
	No	5		Rather Positive	4
6	Everything	18		Negative	4
	Most	12	13	It needs more time	19
	Nothing	3		Students English is insufficient	16
	Not much	2			
14	The children are very excited about experiencing new thing. Children say it is interesting to learn English in other lessons. Children Understand more English and have a chance to practice more, Exposed more to English vocabulary. Interesting way of studying.				

Appendix 7 End of Course Questionnaire

Grade _____   Class   _____

Tick the box you feel is true for you.

I looked forward to my Maths lessons this term.

strongly disagree ☐ disagree ☐ neutral ☐   agree ☐   strongly agree ☐

I found my lessons interesting and fun.

strongly disagree ☐ disagree ☐ neutral ☐   agree ☐   strongly agree ☐

My lessons were easy to understand.

strongly disagree ☐ disagree ☐ neutral ☐   agree ☐   strongly agree ☐

I feel that I learned a lot of English during this course.

strongly disagree ☐ disagree ☐ neutral ☐   agree ☐   strongly agree ☐

I feel that I learned a lot of Maths during this course.

strongly disagree ☐ disagree ☐ neutral ☐   agree ☐   strongly agree ☐

Appendix 8A Year 9 Sample Observation Analysis

- The teacher had a very detailed CLIL lesson plan, the lesson finished with the students completing a self-assessment and peer assessment using the rubric.
- Learning outcomes and objectives were referred to and questions were asked to see if they had been met.
- The lesson will continue the next day so students will complete all learning stations.

	CLIL Teaching Strategies: Student engagement, Classroom management, Differentiation
Strengths	- Independent learning style – encouraging students to work in groups with a group leader to complete tasks assigned. Students worked enthusiastically and collaboratively. - Rubric for assessment was discussed and clarified. - Learning outcomes and objectives were discussed and were displayed around the room. - Engagement - Students very engaged in all groups - Students were respectful to the leaders when they explained the tasks set at each station - Teacher encourages and supports all students that there is full participation within each learning station - Students and teacher had many discussions where the teacher formulated questions to the students rather than giving the answers - Teacher encouraged students to solve the questions within the group rather than asking the teacher directly - A variety of learning styles were addressed within each activity eg Role plays, Use of ICT - Whole class introduction to the topic before breaking into groups - Use of ICT within learning stations - Classroom set up to enable station activities - Resources well prepared prior to lesson - Timer was used to keep the students to task. - Students were well organized and completely engaged. - Learning environment outstanding and very student centered. - Student feedback and suggestion wall is there for students to make comments and suggestions or ask further questions - Next steps flip charts were there for students to give feedback and suggestions - Groups were formed using numbers on their tables. Group leaders were informed at start of lesson. - Student work with detailed comments displayed inside and outside classroom.
Points for development	- Differentiation within the group was unclear - Extending student leadership within the class, having students complete the whole lesson without as much teacher instruction. - More higher ordered questioning that requires students to have more in depth discussions. - Creating an environment where students feel they can question the teacher at a higher level, rather than teacher directing discussion. - Having students feel comfortable to debate an issue independently under student leadership and guidance
Next steps	- In feedback session, discuss: - Assessment for learning with teachers. How did they know who understood the concept? Did everyone have a part in the learning within each group? How was this monitored? - Connection with previous learning - Given that the class is streamed and this is a top stream, are all students at the same stage in their learning if not? How was the learning station differentiated to meet all learning styles? - Have students help develop activities.

Appendix 8BTool for measuring CLIL in the classroom (Format and language adapted for this study)

Observed Teacher:
Number of observed times:
Faculty:
Subject:
Name of Observer:
Observation Nº:
Observation Date:
Observation Time:

Section I – Observation Criteria		
Observed Criteria	**Comments**	**Suggestions for improvement**
1. Lesson & Material Preparation a. Introduces CLIL-driven outcomes. b. Plans vocabulary work. Emphasize key vocabulary (e.g., write, repeat, and highlight) for students. c. Divides the lesson into different, recognisable stages.		
2. Comprehensible Input to Communicate Meaning a. Elicits and links past learning to new concepts b. Builds schema in warm-up. c. Avoids difficult language. d. Enunciates/articulates clearly. e. Paces talk & Signposts. f. Provides realia, visuals, and/or manipulatives. g. Provides clear instructions. h. Frequently checks student comprehension.		
3. Promotes extended output a. Creates opportunities/activities that increase Student Talk Time in English. b. Uses strategies to minimize Teacher Talk. c. Fosters a student fronted/centred classroom		

d. Promotes Higher order thinking: moves from knowledge and comprehension to application, analysis, synthesis, evaluation, and creation (Blooms' Taxonomy). (HOT) through questions and activities.		
4. Feedback on Meaning & Form a. Praises and encourages. b. Negotiates meaning when needed. c. Encourages self and peer correction. d. Provides explicit error correction and explanation when needed.		
Section II – Observation Outcome:		
a) Conclusion		
b) Recommendations Observer's suggestions for actively involving students in language-content integrated learning		
Section III - After Observation Questions		
1. What strategies did you use? Did you adapt them for this lesson?		
2. How was student engagement, use of mathematics, ICT? Was this different to any other lesson?		
3. There are few points to consider in the second section. Would you adapt these in future lessons?		
4. The feedback sessions suggests a few ideas that can be looked at. Do you agree?		

Appendix 9 Results from all Questionnaires

Questions	Teachers Questionnaire results	Students Questionnaire results	Parents Questionnaire results
1.	2-no, 2-maybe	17- very good, 9-good/3-poor	20-very good, 9-good, 6-fair
2.	4-yes	16-yes, 3-maybe	25-yes, 7-maybe, 3-no
3.	4-yes	5-good, 10-fair,12-poor, 2-very good	28-yes, 4-no, 3-maybe
4.	4-Through English	14-very good,8-good,5-fair,2-poor	23-no, 4-yes, 8-maybe
5.	4-yes	15-yes,6-depends on subject, 3-no, 5-maybe	19-yes, 11-not sure, 5-no
6.	4-yes	7-maybe, 16-no, 6-yes	18-everything, 12-most, 3-nothing, 2-not much
7.	2-team teaching, 2-IELTS 6	19-yes, 10-no	21-well, 11-very well, 3-not so well
8.	4-yes	16-everything,7-most, 6-not much	26-some of it, 8-most of it, 1-everything
9.	4-both	15-everything, 9-most, 5-not so well	28-yes, 5-not sure, 2-no
10.	4-English only	22-some of it,7-most of it	30-yes, 3-not sure, 2-no
11.	4-yes	25-yes, 3-not sure,1-no	34-yes
12.	4-no	24-yes-4-not sure, 1-no	27-positive, 4-rather positive, 4-negative
13.	2-yes, 2-maybe		19-it needs more time, 16-students English is insufficient
14.	Enough resources, Assessment Criteria, qualified teachers who have proficiency in English, time, preparation, second language, subject integration		The children are very excited about experiencing new thing. Children say it is interesting to learn English in other lessons. Children Understand more English and have a chance to practice more, Exposed more too English vocabulary. Interesting way of studying.
15.	Language development-skills-based teaching-critical thinking because it is teaching in real contexts. Motivation to learn Maths and English		